TS

approach

JULY 1968 THE NAVAL AVIATION SAFETY REVIEW

Innocent looking cumulus clouds

The Thunderstorm

With the arrival of summer it is again time to refresh the pilot's memory concerning thunderstorms. Each year it is hoped that new knowledge can be added to old established facts so that we can outwit this phenomenon of nature. Unfortunately, all we can offer is a different arrangement of the sentences for renewed reader interest.

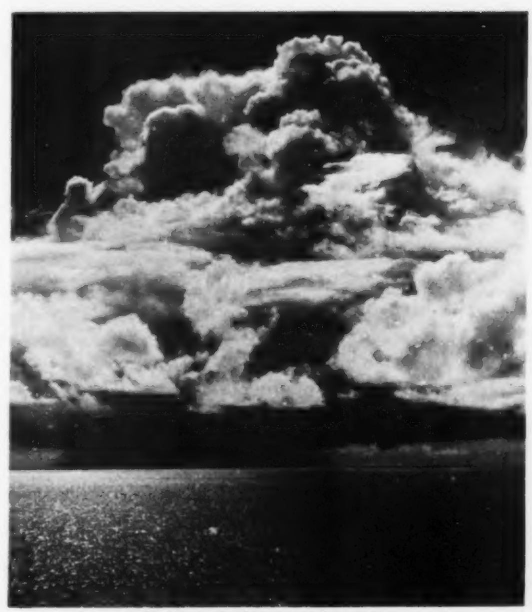
We all know it is unwise to penetrate a thunderstorm with an aircraft. Fortunately, however, such menaces of the airways are generally predictable, understandable and easy to see. The experts have classified them into three stages, (1) cumulus, (2) mature and (3) dissipating. These barriers to safe flying develop out of harmless and innocent looking clouds which are generally known to aviators as "good weather clouds" floating about 5000′ above the surface.

The Cumulus Stage

With the addition of sunshine, nature literally cooks "little ole" cumulus clouds into storms. After absorbing heat, a particular cloud will reach a point where it is atmospherically unstable. Then it will start expanding like a balloon sending its top up into the heavens to 40,000′ in about 15 minutes. At the same time, the base diameter fattens out in similar proportion. Updrafts, extreme turbulence and ice are the main dangers to aircraft in this first stage which seldom lasts more than half an hour.

The Mature Stage

This second and most violent phase of the thunderstorm commences when the rising clouds become



Full fury of the second stage

saturated and the updrafts can no longer hold moisture. This triggers off violent action by sending heavy rain back to the earth's surface accompanied by multidirectional winds. Snow, hail and sleet are often present in certain areas of the clouds while lightning starts to steal the show with lengthy and frightening fireworks. The second stage lasts about as long as the first and it develops the familiar "anvil top" fingerpointing the storm's course which usually averages about 10 mph.

The Dissipating Stage

As the wind and rain show signs of abating, the third stage commences and is the longest lasting until the clouds shrink back to harmless cumulus size again. The time will vary from 2 to 5 hours. Dangerous lightning and diminishing turbulence will linger until the cloud gets back to cumulus size again so that cloud penetrations are not advisable but circumnavigation becomes increasingly more feasible.

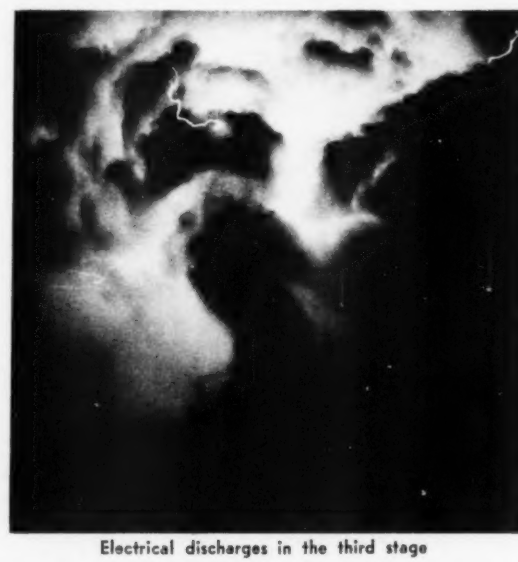
When thunderstorms first start forming on a hot afternoon, they are individualistic and cause the weather people to issue a scattered thunderstorm warning. Frequently their instruments will tell them that the atmosphere is extremely unstable. Consequently they will predict lines of thunderstorms for later in the afternoon.

The scattered thunderstorms seen earlier will progress into their dissipating stages and new ones will be continuously developing all around the dissipating ones (whose lightning will continue to make visible contributions as if all were one big storm). The ever-increasing numbers of new thunderstorms will finally culminate in the lines of thunderstorms predicted earlier. All of this tends to give people the impression that the first scattered thunderstorm of the afternoon is the original one which ultimately grew into the great big massive line of thunderstorms. This erroneous impression is fortified by the visible fact that the dissipating clouds of earlier storms merge together and support one big anvil top sometimes reaching up to about 60,000′.

Disillusions of the Dissipating Stage

The most violent thunderstorms seem to occur late in the afternoon so that it is often very close to sundown when the dissipating stage commences. The lightning will persist far into the night as long as there is still some form of cloud support. In the darkness, everyone assumes that the storm is still raging in the distance at its full violence because the contrast of darkness allows lightning to be seen far away. Most people think that as long as electrical bolts are being generated, the distant storm is beating up that unfortunate part of the earth thereunder. When you see this distant night lightning, watch it for awhile

One of the many forms of lightning



Electrical discharges in the third stage

and you will notice that most of the bolts stay within the clouds. If so, the storm is no longer in its most violent second stage. The lightning, however, can still do harm to aircraft penetrating the area.

Scattered thunderstorms can be circumnavigated and the pilot can usually remain VFR. Lines of thunderstorms, however, are often impenetrable VFR. In any case, specific thunderbumpers present the greatest danger to aviation during their first and second stages. So, be patient and wait for the rain to stop which signifies the beginning of the third

stage. Then there is usually a visible safe VFR route underneath.

Study Thunderstorm Reports Before Takeoff

Flying toward a thunderstorm area, the pilot should set about to determine the best course of action tempered with the urgency of the mission. That is: how to get *safely* on the other side with a minimal loss of time. This is especially true if on a combat mission with orders to reach the target regardless of weather or enemy action.

It is usually not SOP to launch a mission (combat or otherwise) when a thunderstorm is crashing down upon the field (or CV). As stated earlier such storms creep on at about 10 mph, so be patient until a safe takeoff can be made. The main job then is to figure out the best way to cope with the monster if it is encountered enroute.

Thunderstorms Have A Terrific Rate of Climb

When cumulus clouds can be seen some 30 miles ahead on a hot summer day, it is possible that they may develop into dangerous thunderstorms by the time you get there. A whole line of these cotton balls across your flight path can conceivably create a barrier which you cannot get around or through while remaining VFR. Many pilots with extensive cross-country experience have been tricked at one time or another into thinking they can climb over the top of the build-ups. Here is an example where the pilot thought he was already higher than the tops only an estimated five miles away.

Illusion at the Top

A *Crusader* pilot had just completed some air intercept practice and the GCI controller held him at FL 395 while giving him turn instructions to circumnavigate a solid line of known thunderstorms. At this time, the pilot reported his true airspeed to be 450 kts. This is Mach .78 or 225 KIAS. While complying with turn instructions, the pilot informed GCI that the tempest was about five miles west of him and he was above the clouds. The controller asked the pilot if he could fly over the storm and he received an immediate affirmative answer. A few seconds later, the pilot made his last transmission acknowledging to a course vector. About two minutes later, the F-8A disappeared from the ground radar scope and ultimately crashed at sea killing the pilot.

The basic cause of the mishap was classed as undetermined but there is strong circumstantial evidence that the pilot erred in his attempt to get over the storm. It seems reasonable to assume that the pilot was climbing while obeying the GCI turn instructions. This combination could reduce airspeed while increasing positive G thereby putting the plane marginally close to a stall/spin condition.

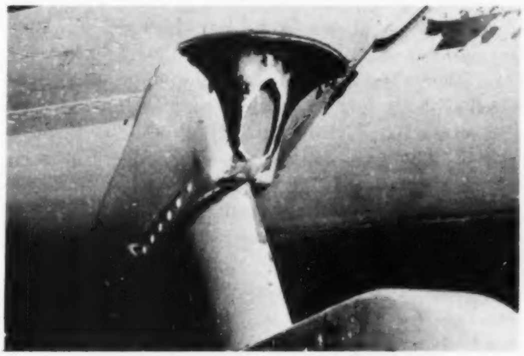
Board investigation concluded that, ". . . because of the cocked-up attitude of the F-8 at 225 KIAS at FL 395, the natural tendency is to sight along the longitudinal axis of the airframe making it very easy to be deceived as to the tops of clouds. The pilot probably did not realize that he could not top the thunderstorms until too late to turn away. He probably flew into the top of the storm at a slow airspeed. If he selected afterburner it is probable that he did not get a light because of his altitude and airspeed. The loss of SIF and radio at about the same time would indicate an electrical failure. The F-8 has in the past exhibited a tendency to flameout under similar circumstances and it would account for the electrical failure.

"Vertigo and an unusual attitude following a flameout under instrument conditions would tend to confuse any aviator and in particular a pilot with limited flight experience. . ."

There are other accounts by more fortunate pilots who have survived such penetrations by being sharp on the gages and still others who bailed out successfully. Those who survived by parachute descent have recounted their being pelleted by hail and of violent roller-coaster rides in the updrafts and downdrafts within the storm.

Penetrations Cannot Be Stereotyped

Some recent incidents of intentional thunderstorm



Fiberglass damage to the *Cougar*

penetration are not only interesting but help stimulate thought in this area. The first one concerns a VT aircraft.

The TF-9J pilots filed IFR into known thunderstorms with ATC surveillance radar assistance. Climbing through FL 250 flight conditions became solid IFR and stayed that way as the aircraft leveled off at the assigned cruising altitude of FL 330 indicating Mach .74. Turbulence was intermittent but

Lightning gouges on the *Neptune*

St. Elmo's Fire singed the C-47's tail

moderate in intensity. As the turbulence picked up, the front seat pilot asked ATC for guidance. ATC advised that they were painting a few real thunderstorm cells near the *Cougar* but their present course would avoid them. Shortly thereafter, the pilots ran into rain which turned to hail in about a minute. Turbulence became severe and lightning flashed very close occasionally. Gs experienced varied between 0 and +2 and altitude could only be held at about ±500′. After two minutes of hail battering, it quit and turbulence diminished. The remainder of the flight was completed without further incident and VFR conditions were encountered as the aircraft descended through 10,000′. The hail damaged leading edge fiberglass but only removed paint from the metal sections.

The Ever Present Potential of Lightning

An SP-2H was descending after completion of a night IFR cross-country. Passing through 9000′ strong updrafts were encountered so that the pilot retarded the throttles until reaching gear-down speed. As he lowered the gear and set the flaps at 20 degrees, a blinding flash was noted. Simultaneously, a concussion shook the airframe. The omni receiver failed but all other radios continued to function. Even though the rudder appeared to bind slightly, a routine landing was accomplished. Ground investigation revealed lightning had struck the top of the vertical stabilizer and the aft tip of the fiberglass MAD cone.

Innocent Looking Clouds Can Be Deceiving

A C-47H survived all of a thunderstorm's repertoire causing the crew considerable consternation. Cruising along at 11,000′, the crew had filed IFR because of reported thunderstorms enroute. As predicted, a line of thunderstorms ultimately blocked their path. The clouds did not appear to be developed into the full fury of the mature stage so the crew pressed-on according to plan. For the first five minutes the only thing encountered was moderate turbulence. Then the air got rougher while rain, snow and hail all made brief appearances. This excitement was capped by the appearance of a small fireball at the peak of the windshield. The crew could only stay on the gages and hope that this appearance of St. Elmo's Fire would burn itself out—outside. Unfortunately, it quickly grew into a large fireball and exploded as it swept aft along the top of the fuselage.

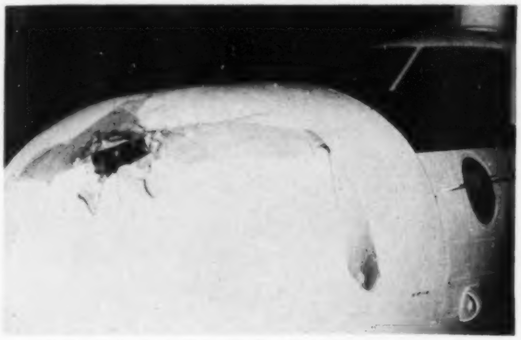
The crew was relieved to be still flying in one piece when they got through the storm in another few minutes. Slow flight checks revealed that no unusual flight restrictions seemed to prevail so a precautionary landing was made successfully.

Postflight inspection showed that the upper third of the rudder was ripped and the inside metal stiffeners had extensive burned holes requiring the control surface to be replaced. The only other damage was that the magnetic compass had gone ape and had to be replaced.

Lightning Has a Long Reach

An incident to an SP-5B proves that aircraft do not have to fly in the clouds to get struck by lightning. The pilot of the aging *Marlin* thought he had it made when he saw a clear area between two clouds working themselves into maturity. Flight altitude was

5500′ and the trailing wire antenna had been extended to obtain a loran fix. Suddenly, a bolt of lightning cracked in full view of the pilots blinding them for about 15 seconds. A few seconds after the strike, dense smoke began filling the bow and electronic compartments. Fortunately, by the time the pilots' eyeballs had readjusted, the smoke disappeared almost as fast as it had started. Moreover, the plane still performed normally.



While clear of the clouds, this *Marlin* was struck.

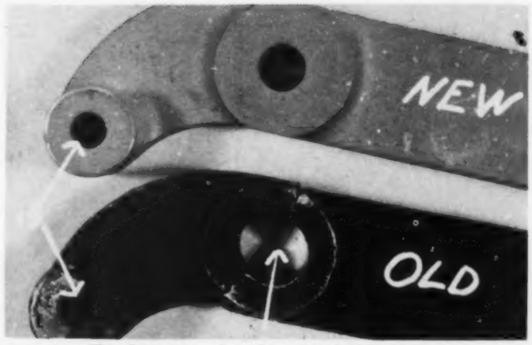
Inflight investigation revealed a large hole in the Barney Google nose radome. There were burn marks on some sections of electrical cables and antennas and the trailing antenna had lost its fish. A safe landing was accomplished at the home base.

The files are full of incidents like the ones just related. Moreover, there are AARs on file where the accident cause is UNDETERMINED but there is strong evidence of losing the battle with thunderstorms.

Thunderstorms Attack Things on the Ground Also

Turbulence does not confine itself to airborne aircraft as demonstrated by this incident to a *parked* C-54Q. Thunderstorm warnings were in effect so the line supervisor was doublechecking aircraft tiedowns. He noted that the *Skymaster* was being buffeted back and forth so that the nose wheel moved too much. Consequently, he ordered that the tiedowns be doubled. While the additional work was being performed, the crew heard a loud crack which seemed to originate at the tail section of the airplane.

A quick inspection revealed then that the elevators were flapping freely in the wind. Thinking the gust lock was not engaged in the cockpit, a quick check therein revealed it was ON. There was no time to troubleshoot because the elevators had to be secured quickly—somehow. This was done by tying the control yoke in the full aft position with a line. Post-incident investigation revealed that the wind force



Thunderstorms also do ground damage

on the elevators had caused the gust lock, itself, to fail.

There are other incidents of thunderstorm damage to parked aircraft. Recently, a well secured T-33 was struck by lightning associated with a passing thunderstorm. The lightning bolt entered the top of the vertical stabilizer, passed through the aircraft and did visible damage to the parking mat concrete. Fortunately, damage to the *Shooting Star* was minor.

Gaging Distances With Lightning and Thunder

Questions have arisen regarding that portion of NavAer 06-50502, Handbook on Aircraft Refueling, which states: "Discontinue fuel handling operations during severe electrical storms," and NavWeps 05-5-503, Hot Refueling Manual, which states: "Discontinue fuel handling operations during electrical storms when the station operations officer so directs."

At what point do fueling operations cease? Since this decision depends largely upon the judgment of the operations officer and fueling crew, it might be well to memorize this rule-of-thumb on how to gage the proximity of an electrical storm:

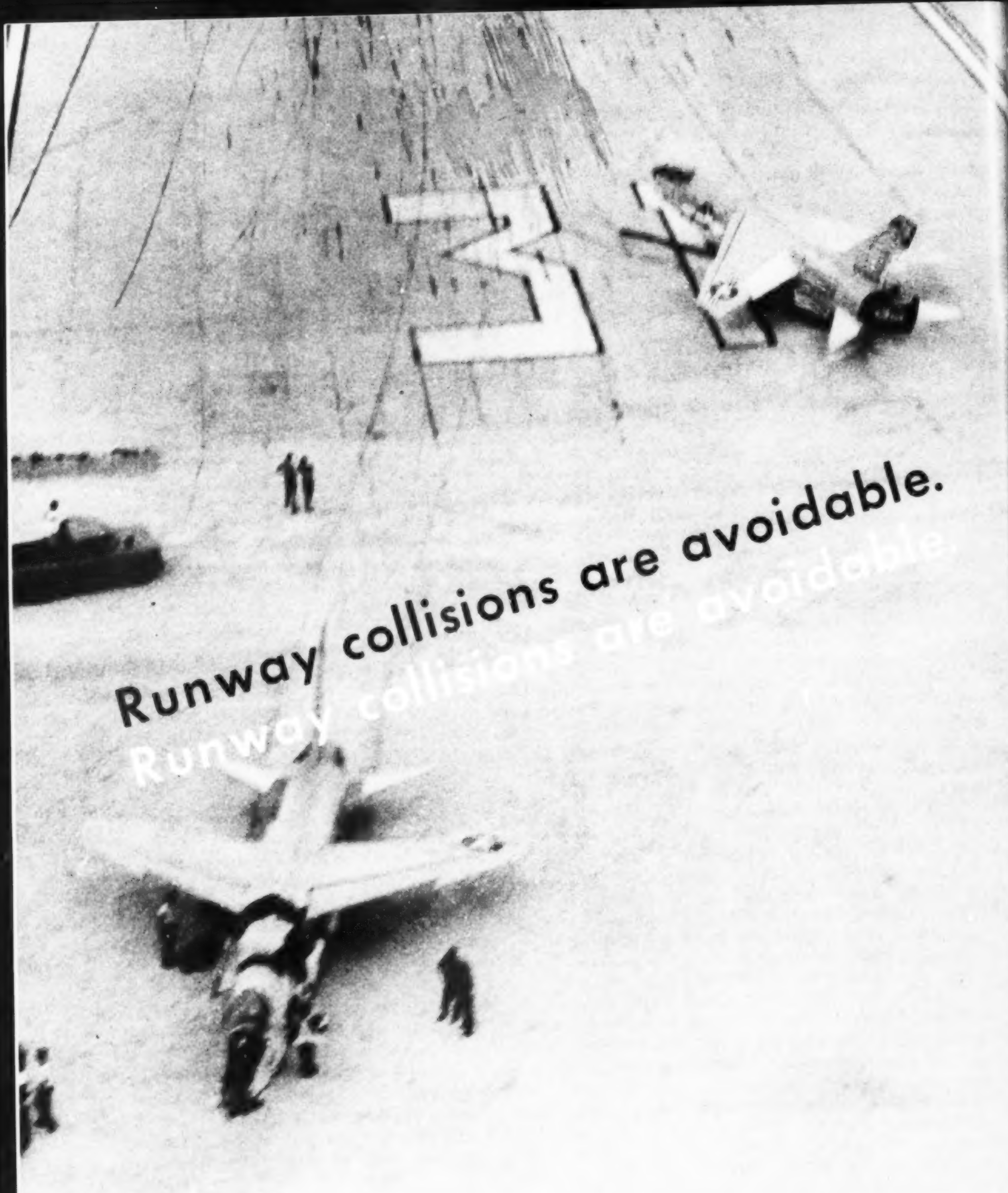
Remember: Speed of sound is slower than speed of light.

1. Count the seconds between sighting the lightning flash and hearing its thunder.
2. Divide the seconds by five for the distance in miles.

Press-on—but Not Regardless

Although many airborne aircraft have been struck by lightning, the resultant number of crashes are few. On the ground, however, lightning has a very impressive record of damage. The moral of such facts is "don't press your luck." Ground aircraft and equipment wherever this is feasible.

All thunderstorms should be treated with constant caution because they are moody and sometimes radical. So—, if they trick you by encirclement or you are on an IFR plan and must go through, be sharp, stay sharp, believe those gages and—good luck.


Runway collisions are avoidable.
Runway collisions are avoidable.

KEEP THE RUNWAY CLEAR

Two F-8Es completed some formation tactics and were returning to base. The runway was wet from a recent rainstorm. After the squall passed, the wind was calm for the approaching *Crusaders.* The leader landed on the starboard side and had no difficulty in stopping at the 6000′ marker.

The wingman aimed for the port side holding what was considered a normal interval. He touched down slightly fast in front of the mirror. Because he had an ordnance load aboard, the nose wheel could not be held off the deck below 100 kts. Consequently, maximum aerodynamic braking was not available. The pilot felt the need to apply heavy braking action when the nose wheel could not be held off. With 2500′ of runway remaining, the starboard tire blew, causing the airplane to swerve to the right. This caused the pilot to hit the left brake harder and quickly blew the port tire. This caused the F-8 to zigzag down the runway centerline.

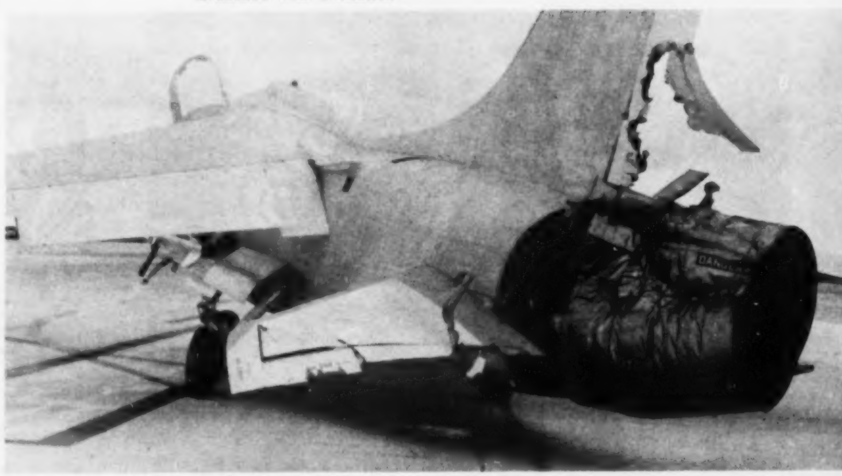
Meanwhile, the leader had stopped on the starboard side of the runway and was trying to obtain tower permission to turn left across the duty to reach the dearming area. At the same time, the tower was trying to clear the lead aircraft off the starboard side of the strip and their transmissions apparently clashed.

This combination of difficulties resulted in a ground crunch between the two *Crusaders*, doing considerable damage. The pilots were unhurt.

When aircraft are landing close behind, pilots must not linger on the runway. Moreover, visual reference to all aircraft in close proximity must be maintained until parked and chocked.

A bloody-nosed *Crusader.*

Crunched tail *Crusader.*



THE UNGARBLED WORD on Noise and Hearing Damage

By CDR G. R. Hart, MC
Chief Otolaryngology Service
Naval Hospital, Philadelphia

"Doc, my wife says I'm deaf. I know I'm not because I hear fine when I'm flying. But at a party I'm lost. I just can't understand what people say there much of the time."

This conversation is fairly typical of at least one sick call visit somewhere in the naval establishment daily. Once again, noise has gotten to the patient. Noise is an invisible, but by no means silent, destroyer of human tissues. And most unfortunately, its ravages often cannot be repaired or compensated for in any way! Most fortunately, however, its bad effects can be prevented.

Acoustic energy is a form of power and is measured in units of sound pressure. Unlike the skin burn from sunlight, noise gives warning of its damaging presence on first exposure—by clearly and simply being loud. Any area where conversation is impossible is potentially hazardous. What warning could be clearer?

What is the mechanism for this damage? Pressure waves of all intensities produce what is eventually recognized as sound in one form or another by a chain reaction. The ear drum is first set into motion by the sound waves to a varying degree dependent upon the intensity and frequency of the sound source. Attached to the ear drum is a lever mechanism of small bones which mechanically transmit and amplify the pressure waves (Figure 1). The footplate of the stapes, the third bone in the series, converts the linear force into a compressing force, acting like a piston in a cylinder of an engine being cranked to set in motion the fluid of the inner ear. The inner ear can be considered as a long tube, (curled upon itself) wherein lies the mechanism for the conversion of physical energy to electrical energy. As the stapes footplate moves in and out at frequencies up to several thousand times a second, the fluid within the inner ear will likewise vibrate similarly and cause a membraneous structure to touch and stimulate the ultimate sound receptors,

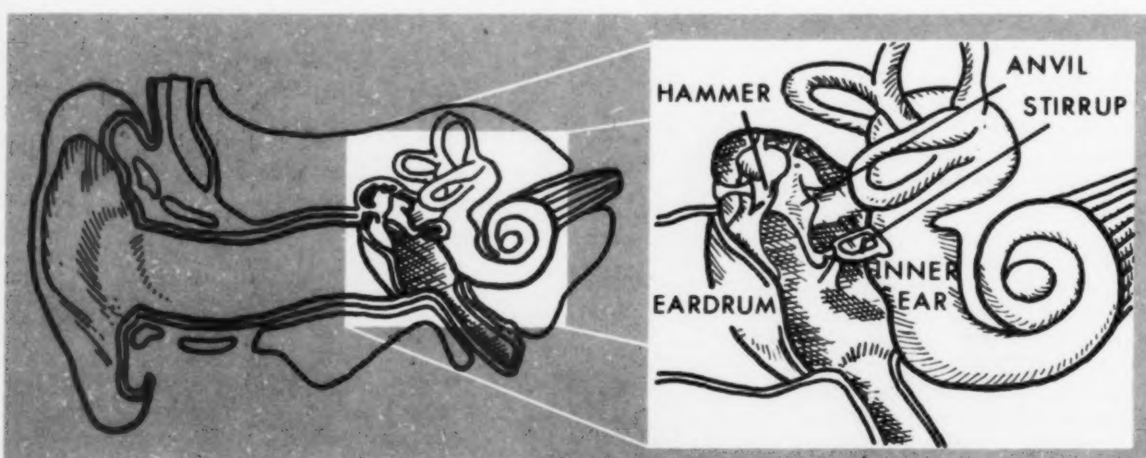


Fig. 1

Fig. 2

the hair cells of the cochlea. When physically stimulated, they produce an electrical discharge which when properly routed through the acoustic nerve is interpreted as sound.

Now it just so happens that the receptor cells for high frequency sounds are immediately adjacent to this vibrating surface. Intense wave movements generated here literally destroy these tiny hair cells—knock off the insulation, if you wish—and create a short circuit. This is in part responsible for the ear noise noted by many patients with high frequency hearing loss.

More importantly, the loss of ability to hear high frequency sounds results in inability to distinguish between high frequency consonants (s,t,c,z, etc.) and then the message comes through garbled. This high frequency loss is often permanent and irreparable. The degree of damage is dependent on several factors: the intensity of exposure, the length of exposure, the period of rest between exposures and the innate ability of any given individual's ear to resist damage. All of these are very variable factors and all but the last may be effectively influenced for prevention of damage.

What can be done about it? Further loss *can* be prevented. Ear muffs and/or ear plugs protect hearing and enhance audition in noisy areas (Figure 2). The flight deck crew has long been aware of the problem and knows full well the value of protection. Maintenance personnel are similarly aware of the problem and should utilize defenders and sound attenuating communication equipment at all times when noise levels are above 85 decibels. In addition, limitation of periods of exposure with the interspersing of adequate periods of aural rest will greatly decrease the risk of damage. The sound conditioning of working spaces and/or the performance of elective noisy work out-of-doors greatly reduces the harmful effect of noise on the inner ear.

Now, how about the pilot? He literally must sit in the midst of a sea of noise. He, too, can and must be protected. The first step in protection must be aircraft design. Hopefully the day will not arrive when the cockpit will be uninhabitable from a noise hazard standpoint. Sound attenuation can still be achieved with the use of radio earphones, occasionally supplemented with the use of insert type defenders. The use of individually fashioned ear molds with hearing aid type receivers such as are now in use by our astronauts may be the ear defenders and communication devices of the future. For the pilot or aircrewman wearing a helmet, much additional attenuation is provided by this device. Not only are the ears protected by the helmet and the ear muffs, but, in addition, the skull, which at high intensities functions well as a receiver of sound, is shielded.

Finally, what can be done for the person with a high frequency noise induced loss? There is no medical or surgical cure. Fortunately, most persons' losses involve the frequencies above the speech range; hence no great problems exist. As the area of loss widens and deepens, instruction in speech (lip) reading is most useful. Indeed, this is all that may or need be done for many individuals. As a rough index of capability, little more can or need be done as long as one can satisfactorily use the telephone or adjust his volume control with good effect. Currently being evaluated is a simulated in-flight test of the ability to understand unrelated, non-aviation type words against a background of engine noise. A poor score on this test could indicate a need for further help. Finally, some individuals will require electrical amplification of sound. Most individuals benefit tremendously from a properly selected and fitted hearing aid, while a few others cannot or will not be helped. The Aural Rehabilitation Center at the Philadelphia Naval Hospital has been designated by the Bureau of Medicine and Surgery as the facility to which all Navy and Marine personnel should go for evaluation and treatment.

By and large, hearing loss is not a bar to the performance of duty and continued fitness for same. Many individuals may be returned to duty with hearing aids and in accordance with the Navy's Hearing Conservation Instruction. Admittedly, hearing loss of a certain level may restrict one's flying category, but this is done to protect the individual, not to penalize him for a physical defect.

Finally, noise is a hazard; deafness is preventable; help is available. It's up to you to protect your ears and to ask for help if the word is garbled. ◄


'There
I was. . .'

I was lead aircraft in a cross-country flight of two F-8Cs on an IFR flight plan. The section takeoff, climbout and enroute cruise at FL 390 went as briefed until, about halfway to destination, my UHF transmitter became intermittent. At that time I passed the lead to my wingman. The remainder of the flight and our initial contact with approach control was uneventful.

After receiving clearance, we commenced an enroute descent to destination. During the penetration transmitter problems had seemingly corrected themselves and all stations were reading me loud and clear.

The weather at destination was reported at 700′ overcast, with 2-3 miles visibility. The flight had been briefed to make individual approaches if the ceiling was less than 1000′. My wingman led the penetration from cruising altitude to level off at 4000′. The cloud cover was solid from 700′ to 6500′ with several layers above that to FL 330.

After leveling off at 4000′, approach control split us up for individual approaches, with the other F-8 to land first. About 5 minutes later I was cleared to descend to 1900′ and was turned for a long downwind. I called leveling off at 1900′ and promptly experienced a complete UHF transmitter failure. Up to this point I had not received any "lost communication" procedure. I continued on my last heading and altitude and made several ID turns in response to GCA's attempts to identify me and see if I still had a receiver. This went on for another 4-5 minutes and I was nearing bingo fuel for my alternate, 165 nm to the southeast. The alternate was forecast to be 1200′ broken with 7 miles visibility.

After 4 to 5 minutes of responding to GCA's requests for ID turns, I experienced what I first thought was a generator failure. I lost my radio completely, also my VGI and fuel gages. I immediately deployed the RAT and turned it on, only to find that it did not improve my predicament.

My situation was now: (1) flying partial panel, (2) no navaids, (3) no communications and (4) flying at 1900′ in an area where the minimum safe altitude within 25 nm was 2500′.

I elected to climb partial panel until I was clear of clouds and head for my alternate, hoping to find a hole for a VFR letdown. My problems were compounded because my fuel required to alternate didn't allow for a deployed RAT. I realized this, and after consulting my nav pubs I figured I could find a field somewhere along my flight path if I could only get below the cloud cover.

I recomputed the fuel required to fly to my alternate at my present airspeed and fuel flow, climbed to FL 200 and slowed to max endurance to reduce

the drag on my RAT.

Just at 1125 when I estimated that I was over my alternate, my "low fuel" light came on. There were no holes below me, but the cloud cover looked promising to the southeast, so I started to letdown. I estimated that I would flame out in about 20 minutes.

All this time I was troubleshooting my aircraft problems and discovered that I had a partial a.c. electrical failure and there was no way to regain the lost power.

Without any holes in sight I entered the clouds at about 7000′ and made a partial panel penetration. I had already decided to eject if I couldn't become VFR by 2000′. At 2500′ I caught a glimpse of some trees below me. My spirits lifted a little and I decided to continue the descent to 1500′.

At 1500′ again I saw some trees and a piece of a road. I made a hard descending turn, still IFR, found the hole again and bottomed out at 250 to 300′ above the terrain, in rain. I picked up the road and headed south. After about a minute I came to a small town and circled it, hoping to find a municipal airport—no luck.

I started south down the road again, and figured that I had less than 5 minutes of fuel remaining. I decided to land on the highway. Traffic was very light and the road was reasonably straight. I started slowing down to dirty up when I saw an airstrip about a mile west of the road. I was still at 300′ in the rain and couldn't see the whole runway, but it looked better than the road.

I turned for the runway keeping as high as possible and held 220 knots clean until I was certain I could make it. I dirtied up in the groove and was just about to touch down on the overrun, when I saw a jet barrier rigged at the junction of the overrun and the runway. I was at idle and on speed and I'm still not sure how I got the airplane over the barrier. I missed it, however, and landed rather hard on the runway beyond the barrier. It was then apparent that this was a jet runway, at least 150′ wide and sufficiently long. I stopped 3500′ after touchdown at the 4000′-remaining sign.

The airfield was deserted, but there was an RSU (runway service unit) at one side. I parked there, shut down (with about 150 lbs of fuel remaining) and installed the seat pins and downlocks. There were some farms a few miles away, but since it was still raining, I elected to wait in the RSU.

I found the unit locked, but could see some radios inside. I started to work with my survival knife, removing the door hinges. It took about an hour to get the hinges off because of the rust. Then I went to a mobile generator and got it started. I found all the necessary switches and relays and finally got the radio working. I switched to Guard and made a call in the blind. An Air Force air/sea rescue helo (call sign Pedro) answered and found me about 15 minutes later. After making arrangements for the security of the aircraft, I was flown to an Air Force base nearby. There was no damage to the aircraft, no personal injuries.

It was later determined that the voltage regulator had failed, allowing an a.c. overvoltage to burn out all the instruments I had lost.

The following comments were added to the pilot's statement after reconstruction of the event on a squadron level.

The field at which the pilot landed was a military auxiliary air field, normally used for student bounce landing.

It was later determined that destination approach control and ARTCC radar were painting the aircraft until he made his letdown. At that time the aircraft had been airborne 2 hours and 30 minutes, and Center assumed that the aircraft had crashed.

A SAR helo was launched and had been airborne about one hour before receiving the pilot's call from the auxiliary airstrip.

The Air Force informed the pilot that the jet barrier at their auxiliary fields would be lowered in the future when the airfield is not in use.

The one area in which some aid might have been given the pilot was at his destination during that 4 to 5 minutes in which they were learning of his radio problems. Some quick thinking on a controller's part could have averted the near loss. Information on the ceiling, terrain, and heading to the airfield might have helped. The pilot did make a couple of orbits in the area after climbing to on-top, in hopes that his wingman would come up to rejoin him. It is also noteworthy that the wingman broke out at GCA minimums on his approach—not the 700′ 2-3 miles reported at destination.

To say this pilot was lucky is a gross understatement.

Amen.—Ed.

Wisdom denotes the pursuing of the best ends by the best means.

Frances Hutcheson (1725)

the drag on my RAT.

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At 1500′ again I saw some trees and a piece of a road. I made a hard descending turn, still IFR, found the hole again and bottomed out at 250 to 300′ above the terrain, in rain. I picked up the road and headed south. After about a minute I came to a small town and circled it, hoping to find a municipal airport—no luck.

I started south down the road again, and figured that I had less than 5 minutes of fuel remaining. I decided to land on the highway. Traffic was very light and the road was reasonably straight. I started slowing down to dirty up when I saw an airstrip about a mile west of the road. I was still at 300′ in the rain and couldn't see the whole runway, but it looked better than the road.

I turned for the runway keeping as high as possible and held 220 knots clean until I was certain I could make it. I dirtied up in the groove and was just about to touch down on the overrun, when I saw a jet barrier rigged at the junction of the overrun and the runway. I was at idle and on speed and I'm still not sure how I got the airplane over the barrier. I missed it, however, and landed rather hard on the runway beyond the barrier. It was then apparent that this was a jet runway, at least 150′ wide and sufficiently long. I stopped 3500′ after touchdown at the 4000′-remaining sign.

The airfield was deserted, but there was an RSU (runway service unit) at one side. I parked there, shut down (with about 150 lbs of fuel remaining) and installed the seat pins and downlocks. There were some farms a few miles away, but since it was still raining, I elected to wait in the RSU.

I found the unit locked, but could see some radio inside. I started to work with my survival knife, removing the door hinges. It took about an hour to get the hinges off because of the rust. Then I went to a mobile generator and got it started. I found all the necessary switches and relays and finally got the radio working. I switched to Guard and made a call in the blind. An Air Force air/sea rescue helo (call sign Pedro) answered and found me about 15 minutes later. After making arrangements for the security of the aircraft, I was flown to an Air Force base nearby. There was no damage to the aircraft, no personal injuries.

It was later determined that the voltage regulator had failed, allowing an a.c. overvoltage to burn out all the instruments I had lost.

The following comments were added to the pilot's statement after reconstruction of the event on a squadron level.

The field at which the pilot landed was a military auxiliary air field, normally used for student bounce landing.

It was later determined that destination approach control and ARTCC radar were painting the aircraft until he made his letdown. At that time the aircraft had been airborne 2 hours and 30 minutes, and Center assumed that the aircraft had crashed. A SAR helo was launched and had been airborne about one hour before receiving the pilot's call from the auxiliary airstrip.

The Air Force informed the pilot that the jet barrier at their auxiliary fields would be lowered in the future when the airfield is not in use.

The one area in which some aid might have been given the pilot was at his destination during that 4 to 5 minutes in which they were learning of his radio problems. Some quick thinking on a controller's part could have averted the near loss. Information on the ceiling, terrain, and heading to the airfield might have helped. The pilot did make a couple of orbits in the area after climbing to on-top, in hopes that his wingman would come up to rejoin him. It is also noteworthy that the wingman broke out at GCA minimums on his approach—not the 700′ 2-3 miles reported at destination.

To say this pilot was lucky is a gross understatement.

Amen.—Ed.

Wisdom denotes the pursuing of the best ends by the best means.

Frances Hutcheson (1725)

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COMMAND ATTENTION

By CAPT L. F. Cooper
C. O. NAS Seattle

After three years duty in a major Staff Aviation Safety Office, during which time I attended many symposiums and seminars, I have become firmly convinced that if meaningful gains in accident prevention are to be realized, the time worn phrase of command attention is the best description of how it can be accomplished. By command attention I mean real, honest to goodness, conscientious searching and probing for accident causes—both personnel and material—and then a personal (daily if necessary) follow-through to see that the causes have been removed or corrected. Unfortunately, this type of personal command attention can exist only if the commander has first convinced himself that a zero accident rate is actually possible and is worth the extra time and effort required to make it a reality. Herein lies the problem.

Traditionally the Navy has operated with a "can do" attitude and has covered itself with glory operating long hours with minimum personnel and equipment. I am not suggesting that this is bad and that a radical departure from this policy is in order. I am suggesting, however, that this policy has caused many of our good, well qualified and seasoned operators to adopt the philosophy that as long as such conditions do exist, we will have to suffer the consequences—including a higher accident rate. With such a philosophy accepted by the leaders, how can we expect anything different from those we lead? I submit that this is not a valid and acceptable philosophy but is only an excuse—an easy way out for those who are not yet convinced that it can be done and thus are not ready to exert the maximum effort required.

At a recent seminar held by a Force Commander to search for causes in the command's climbing accident rate, the following reasons were submitted by some of the Air Group Commanders and Squadron Commanding Officers in attendance:

a. The Navy pilot rotation program (from squadron to CRT duty, school etc.) does not provide for pilot professionalism.

b. The squadron C. O. and other senior officers do not have an opportunity to really get to know and observe the new pilots assigned with the present short turnaround and level readiness manning.

c. Changes in Air Wing composition where squadrons used to operating with A-1 and F-8 aircraft are now suddenly switched to an A-6, RA-5C, F-4 environment.

d. The Navy's traditional "can do" attitude.

There are certainly real and important problems that need to be reckoned with and need to be given maximum consideration by both Staff and operational supervisors alike, but I submit that they alone are not the reasons for a continued high accident rate. Real and meaningful command attention of the kind I am referring to in this article will recognize and accept these challenges with increased and better planning and preparation for the commitments at hand. Sure it means extra time and extra work but if it prevents one accident and saves one life isn't it worth every hour devoted to the problem? If you yourself, Skipper, honestly and truly believe that your squadron can operate accident-free and then you set yourself to the task of convincing each pilot and maintenance man in the squadron that it can be done, I am sure that you will be amazed and sincerely gratified at the end results. If, on the other hand, you continue to have doubts, so will your pilots and your maintenance crew and your squadron's performance will most assuredly reflect these doubts.

I expect that on first reading this article, your temperatures will begin to boil and many of you will rebel. Set it aside, let off your steam and then at some later time re-read it and quietly reflect on what it has said. Be honest and ask yourself the following questions:

a. Do I really honestly believe that it is possible for my squadron to operate accident-free for my entire command tour?

b. Am I really giving personal command attention towards preventing accidents in my squadron, or am I just professing command interest and actually delegating command attention to my Aviation Safety Officer and other supervisory personnel?

Once the questions above have been squarely and honestly met and the necessary steps have been taken to answer them affirmatively, I am confident that a substantial reduction in your accident rate will be immediately forthcoming. ◄

Short Snorts

Definition Pride is what compels a man to do his best work the safest way even though there is nobody looking.

Poor Visibility Over Water

An A-1 was conducting some scheduled dive bombing runs on an assigned target boat. Radio communications between boat and plane were established followed by visual identification. The first exercise called for the *Skyraider* to make simulated attacks in a 20-degree dive angle at *an imaginary point* 2000 yards from the boat. After each pullout, the aircraft was to climb back to 4000′ and repeat the sequence. After four successful runs, the aircraft was directed to make abeam attacks from 1500′. Meanwhile visibility had deteriorated because of intermittent late afternoon fog near the water's surface. Some runs were aborted because of losing sight of the boat in the patchy fog condition.

On one determined attack the boat crew observed the plane to maneuver erratically close to the water resulting in its striking a rod antenna sticking up from the boat. Just prior to and following the antenna collision, the *Skyraider* was observed to emit black smoke and rapid changes in engine power settings were detected. Alternating course changes seemed to indicate directional confusion approaching the boat and after striking the antenna. Several hundred feet beyond the boat, the *Skyraider* hit the water in level flat attitude, when it bounced back into the air in a nose-high attitude trailing fire along its starboard side. After a wingover maneuver, the plane dove into the water. The pilot perished in the flaming mess.

Although the exact cause of this accident must be classed as undetermined, circumstantially, it appears that disorientation was a major factor. The combination of a smooth sea, no horizon and intermittent fog lured another pilot to his destruction. Such missions call for definite VFR weather because of the known difficulties of low altitude operations over smooth water plus poor visibility. The detection of fog should have been a mandatory reason for sortie cancellation. Such conditions do not instantly endanger boats so that their crews do not understand the aircraft's problems. Pilots must realize how the combination of sea/fog can confuse them and act accordingly.

Missing Numbers

It has been noted that in about 70 percent of the mishap reports submitted in accordance with OpNavInst 3750.6F which involve the engine, the engine serial number was not cited.

Disassembly and Inspection Reports (DIRs) on engines received by the Center cannot be identified with these mishaps unless serial numbers are cited in the mishap report. This can result in incomplete information being used for engine failure studies and accident prevention.

Operators are requested to insure that all concerned are aware of this problem area and to make every effort necessary to correct it.

A-1 Landing Troubles

A pilot was conducting carquals in a *Skyraider*. He was slightly fast when he got his cut. Consequently, he hit the deck main mounts first and then bounced back into the air. At the same time, the hook snagged the unrigged No. 3 wire. Thinking he had a skip bolter, the pilot began

adding power before he realized he had trapped. The end result was a hard landing with an inflight arrestment, doing minor damage to the landing gear.

The A-1 appears to be the last of the tailwheeled aircraft for carrier operations. Such aircraft have always been touchy on anything but three-point landings and pilots must be constantly reminded of these peculiarities.

Spotlighting . . .

. . . NAS Lemoore's Air Ops Newsletter focusing attention on local operating procedures and changes to regs pertaining to the operation of aircraft.

Noteworthy is an issue describing that station's arresting gear, principles of operation, recovery weights and speeds, retraction time, location, pilot technique and precautions.

A local operations newsletter can be an effective means of communicating such vital safety information and can mean the difference in the successes or failures of *your* safety program.

Picking Up FOD

Light rain was falling making the field marginal VFR. Realizing that the braking action would be poor on the wet runway, the F-8D pilot made every effort to land as short as possible. This necessitated a flat approach close to the stall. About 290′ short of the runway, the pilot felt a "thump" but before he could figure things out, the aircraft bounced hard 10′ farther on. Quickly realizing that he had not yet reached the pavement, he applied full power and made a successful waveoff.

The tower operator informed the pilot that he thought the hook was down. A low pass at the

The wrong kind of tailpipe.

tower for closer scrutiny only verified that something was hanging down which could not be definitely identified as the hook. Fortunately, an A-4 joined the pattern and after a close formation check, the object was ascertained not to be the hook but an unidentifiable piece of pipe.

A very good landing was summarily made and upon being parked and secured, the *Crusader* was inspected. The pilot had settled onto a GCA precision centerline radar calibration reflector and had stolen its supporting pipe.

A properly executed mirror monitored approach would have prevented this nearly disastrous incident. This is another example of what can happen when NATOPS procedures are not adhered to.

Twenty Seconds to Ditch

The pilot under instruction in a UH-34D made a hooded instrument takeoff, climbed out to the west and leveled off at 400′. The altitude was chosen to ensure that the helo would remain well clear of fixed wing traffic at a nearby airport until it could be brought under positive control.

His first intention was to enter the GCA pattern, but since it was saturated, the instructor got clearance for a UHF/ADF approach instead. He took control of the aircraft to allow his squadron mate to restudy the approach plate and began a climb to the altitude specified for commencing the approach.

At 700′, with the power at 43″ MAP and 2500 RPM, the engine momentarily sputtered and lost power. It regained power almost instantly, then abruptly failed.

From this point on, everyone moved quickly. The pilot lowered the collective and entered an autorotation. The student, now functioning again as copilot, removed his instrument hood, threw it out the window and switched the UHF to Guard.

The pilot broadcast a Mayday and their position, then just prior to the flare the copilot secured all switches in the cockpit. Before they hit the water the crewchief also kicked out the escape hatches and strapped back in his seat.

After a relatively gentle touchdown the crew exited the aircraft and were later rescued without further incident.

This is a perfect example of a pilot, copilot and crewchief operating together as a team during a critical emergency. Their training, adherence to proven doctrine and rapid response to an unforeseen problem is indicative of a high state of training and proficiency. In the 20 seconds from the initial malfunction until impact with the water, the crew did all that was required to ensure their best chances for survival.

Under the most adverse circumstances, it is possible to do quite a number of things to increase your chances for survival—if the proper procedures are followed exactly. Training does pay off—so *Be Prepared!* ◄

Here's a sequence of events that most helo aviators dread—power loss on both engines while flying under IFR conditions. With just one more complication this mishap could have ended with disaster.

IFR-dual engine MALFUNCTION IN A HELO!

By LCDR Richard B. Moe, HS-9

WE began the second leg of an IFR flight at NAS Norfolk. Our destination was NAS Jacksonville with a refueling stop for our SH-3A at Myrtle Beach AFB in South Carolina. The weather forecaster briefed us that at our requested altitude of 4000′ we would encounter no turbulence, icing or thunderstorms but that we could expect to be in and out of clouds and showers.

After takeoff, the flight was cleared to 6000′. We encountered solid IFR conditions after 40 miles on course to Cofield vortac. Light turbulence and rain were experienced intermittently until we were about 20 miles north of the vortac. Although intermittent, the turbulence was enough to cause 10-knot fluctuations in airspeed. Torque fluctuations and occasional moderate to heavy rain were also observed. Since we were nearing the TAS limitations which we had computed for our gross weight, we slowed the helicopter to 85 kts IAS.

Shortly after passing Cofield, we requested a lower altitude from Washington Center. It was disapproved and the flight continued on course. Turbulence was still present and the rain appeared to be getting heavier. Then it got very heavy. I thought momentarily that we had encountered hail, since it was so noisy, but on checking outside, I found no sign of anything but heavy rain.

It was about this time that the copilot, who was manning the controls, noticed that we had a near-complete power loss. He called for full power but I didn't hear his transmission. Then I noticed both engine torques at zero, no Nf (power turbine speed) on No. 2 and 40 to 50 percent on No. 1. The nose pitched up to 20 degrees and we began to experience a blade stall. I took control immediately and my first reaction was to use forward cyclic to counteract the pitch-up. This only increased the vibrations so I quickly returned the cyclic to a neutral position and bottomed the collective. Total time from the power loss to bottoming the collective was between four to six seconds yet the copilot saw rotor RPM drop to at least 75 percent.

Recovery from the blade stall was surprisingly quick and although I was maintaining a level attitude on the VGI we were still losing altitude. We broadcast a Mayday to Washington Center and the controller quickly informed us that there was no traffic in our area. We continued to broadcast altitudes as we passed them in the descent.

From 6000 to 4000′ it was a semicontrolled, IFR autorotation at best. From 4000′ on down, we were indicating about 80 kts and I still held a level attitude on the VGI. I don't recall what our rate of descent was but we did feel that the situation was about as much under control as it could be, considering the circumstances.

After the initial stall recovery the copilot had advanced both speed levers with no results. I noticed rotor RPM approaching 108 percent and reacted by increasing collective. This resulted in RPM decaying to 90-94 percent and we encountered another blade stall. Recovery was again rapid and I positioned the collective to hold 98 to 104 percent rotor RPM.

Since we all had chutes, I had briefly considered ordering the three crewmen to bail out during our first encounter with blade stall but I felt that they would be better off remaining with the helo.

Passing through 4000′ the copilot advanced the manual throttles in an attempt to regain power. Number 2 engine turbine inlet temperature (T_5) went immediately to 850° and he secured the manual throttle. Number 1 T_5 advanced to 675 or 680° but no resulting power increase was noted. Throughout the remainder of the descent the copilot milked number 1, hoping to regain power.

Initially, both engines indicated gas generator compressor speeds (Ng) at or slightly below ground idle and the respective T_5 gage indications were abnormally low.

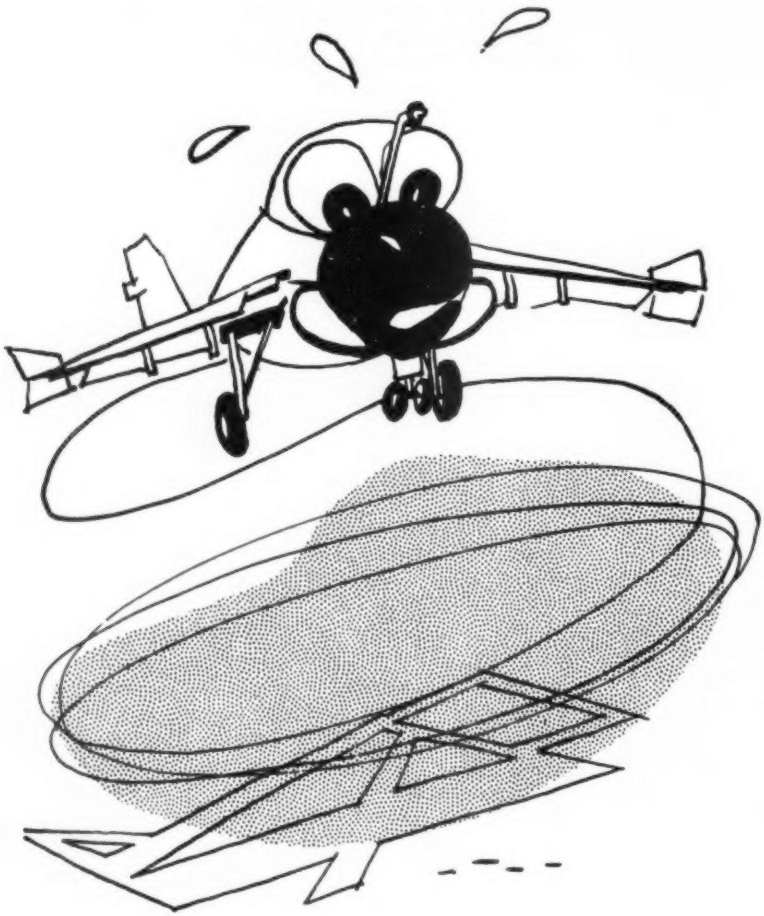
Passing 3000′ and still IFR, I felt some concern about the success of an instrument autorotation to unknown terrain. I doubted that the radar altimeter would be of any use to us. My intentions were to initiate a moderate flare at between 250 and 300′ on the pressure altimeter and use collective to cushion the descent as our airspeed dropped through 30 to 40 kts. I began to slow the aircraft to 65-70 kts.

As we passed 1500′, I saw No. 1 engine turbine speed (Nf) advance rapidly until it matched Nr. The copilot, using manual throttle, kept them matched and we made a gradual single-engine IFR recovery. We levelled off at between 300 and 500′. At that low altitude we could see treetops.

I began to look for a clearing and, at the same time, steered toward a clear, VFR area. After we got in the clear we checked the gages and found that No. 2 engine had also regained power and was now matched with No. 1 Nf.

After relaying our intentions to Washington Center, we made an uneventful, 30-minute flight to Cherry Point. After shutdown there, a visual inspection showed damage to the No. 2 power turbine from overheating.

Excessive water ingestion is strongly suspected as the source of our difficulties. After this experience, a heretofore little-read paragraph in the NATOPS manual concerning rain ingestion is no longer taken lightly by this pilot or by others in the squadron.



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After completing a local systems ordnance hop, in an A-6, we left the target at our 3000 lb bingo, and headed for home plate. While the bombardier-navigator was setting up the system for a self-contained approach, I contacted Approach Control and was informed that the weather was 2000′ broken with 7 miles visibility. This report puzzled me as I was only 15 miles out, on a beautiful, moonlit night and could see only a few low scattered clouds well to the east of the field. We continued the approach after some maneuvering on base leg to avoid another air-

The Sneaky Fog

ANYMOUSE

The purpose of an Anymouse (anonymous) Report is to help detect or prevent a potentially dangerous situation. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experience. As the name indicates these reports need not be signed. Self-mailing Anymouse forms are available in readyrooms and line shacks or through your ASO. All reports are reviewed for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

craft and turned final at 10 miles.

As I rolled out on final, I observed a thin haze or fog layer forming over the field to the east. At six miles I was cleared straight in to land on Runway 05. As we approached 3 miles, the obscuration became worse, and although the western edge of the airfield and the town were clearly visible, we were unable to see the runway lights. At this point, we were informed by the tower that the field had gone to 1000′ overcast and 3 miles visibility. I decided to wave off and recontact approach control for some assistance. The tower had called the weather 1000′ overcast, 3 miles in fog, but I could see no weather at all above the fog, which topped out at about 500′.

On the waveoff, with 1900 pounds indicated, the port main gear failed to retract fully, so I dropped the gear and left them down. Heading for the instrument runway, runway 32, I called Approach Control and requested a minimum fuel GCA due to my gear down configuration and insufficient divert fuel. GCA handoff was smooth, and we were turned onto final at 4 miles.

As we started down, the low fuel light came on at 1200 pounds indicated. This approach ended up high at minimums and right of the glide path. I waved off at 300′ with 900 pounds of fuel. Once on top I could see the faint white outline of the high intensity approach lights.

I declared low fuel state, and informed the controller that I would bring myself around tight and line up on the approach lights to save fuel, then let him work me down from there. This approach was lined up and I took it to 100′ without picking up the runway lights. Waving off with 500 pounds of fuel, I told the controller, in a voice several octaves higher than normal, that I had enough gas for one more pass, and would set myself up as before.

On a tight, VFR type downwind, I raised the gear and jettisoned external stores to save every last pound of gas. After a quick approach turn, I once again heard the calm, professional instructions of my final controller. We settled into the goo, and continued to the threshold without visual contact. Easing it down, I finally picked up the runway lights out the side of the canopy, and kept it coming to touchdown. We didn't acquire forward visual contact until after touchdown! After giving the controller my sincere thanks, I turned off the duty with 300 pounds of fuel.

Night Bombing Irregularities

The briefing was adequate in all respects for execution of the hop. We launched just after sundown in good VFR weather. After rendezvous, we climbed to 10,700′ and held north of the target area for 15 minutes. I flew No. 4 in the division of four *Skyhawks*. I set up my port Mk-51 rack for a Mk-76 bomb run. Station No. 2 through No. 12 and the Mk-51 racks had Mk-76s aboard. Station No. 1 had a Mk-24 mod three flare.

My first run-in seemed normal, roll-in at 10,100′; a called dive angle of 28 deg; called hit at 140′, 4 o'clock. The target was lit with flare pots in the rough figure of a cross, long leg at 6 o'clock. Pullup was with approximately 4 G. The second run again appeared okay except that the target seemed closer. I double checked the altimeter unwinding through 6000-8000′ and pickled at 6200′. The hit, from the starboard Mk-51 rack, was called at 445′ one o'clock with a 34 deg. called dive angle. Pullup again was below 6 G.

The final run commenced at 10,700′, rolling in at 10,000′. I had more than the usual trouble lining up on the bomb line. The sight picture, however, looked to be within the ball park. Again, I seemed quite low and could distinguish the ground around the flare pots distinctly. I thought the Mk-24 flare was still burning at this time. The stick took more forward pressure than I thought it should. (Trim was 2 deg left rudder, elevators 2 deg down and approximately 0 deg aileron.) I thought of aborting the run and rechecked the altimeter; it read 6500′. At this point, the chase pilot orbiting the target called me twice to pull up. I complied immediately, registering 8.5 G. I do not remember pickling the bomb. Summarily, I returned to base, realizing a confusing, unsafe situation was fouling up my bomb pattern.

The error I most probably made was in reading the altimeter (possibly this occurred on the previous run also since the hit at 44′,

Anymouse continued next page

one o'clock would support a lower pickle altitude). The method I usually used during day time runs was to check the altitude immediately prior to roll-in to note my error from the prescribed altitude. Then after the target came into the gunsight, note the rate of altimeter unwinding. I would check it again midway in the run for altitude and rate of unwinding, estimating the time lapse until pickle. At bomb release, I was primarily concerned with the sight picture, noting the swing of the needle through the pickle altitude out of the corner of my eye.

I did not turn up the rheostat which would have improved the altimeter lighting. A tape marking the 6000′ spot on the altimeter would have also been helpful. Perhaps the best tape colors would be luminous strips of red and white. This combination surely would be helpful in preventing a recurrence of my unnerving experience.

Neptune Bounce Drill

I was assigned by the training officer to conduct a NATOPS check of a PP2P attached to my squadron. The flight in the SP-2E commenced at 1340 local. The weather was VFR and the wind at the field was from 320 degrees at 10-15 knots with runway 35 in use.

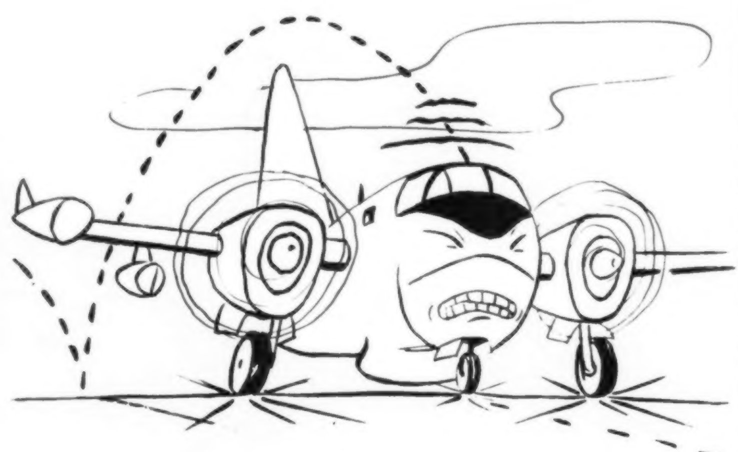
The PP2P made a normal takeoff and complied with a simulated instrument departure procedure terminating with a holding pattern at the vor. A vor approach and some basic airwork followed. Upon completion of the basic airwork, I instructed the PP2P to return to the station and enter the bounce pattern. The first landing following a safe approach (although not strictly in accordance with NATOPS) was slightly hard and resulted in a controllable bounce. While taxiing the *Neptune* back for another takeoff, I briefed the 2P on what I thought was wrong with the landing, mainly leveling off too high and dissipating the airspeed without application of power to check his descent. The second approach and landing was almost identical to the first. I again discussed the landing and corrective action with the pilot.

During both landings I was unaware of the amount of varicam being used, as my usual procedure is to remove some of the UP varicam during rollout. However, I feel that the amount of varicam used in both cases was normal for 20-degree flaps. After a normal but slightly fast third approach, the 2P again leveled off slightly high. During this landing, I put some forward pressure on the yoke without touching the varicam. The landing was hard and the aircraft bounced back into the air. I instructed the pilot to initiate a waveoff. I added jet power and backed him up on full takeoff recip power.

After adjusting the throttles I noticed the airspeed was approximately 105 kts, that we were 50-100′ in the air, and the pilot was applying forward yoke. The airspeed continued to dissipate with a rapid rate of climb. Getting on the yoke, I exerted a maximum effort to push it forward, at the same time applying normal DOWN varicam. I felt no response and looked down and saw the varicam low pressure warning light on with approximately 7° UP varicam indicating on the gage. Switching to the emergency system, I started toggling DOWN varicam.

At this time the aircraft was between 600-700′ with the airspeed approaching 90-80 kts. Sometime prior to this, the pilot had raised the gear, but the flaps remained at 20 degrees. I realized that the varicam was not coming in fast enough to be able to push the nose straight over. I went into a right 60-degree angle of bank just as the aircraft shuddered in a stall. At almost the same time the nose fell through and I then had enough varicam to hold it down. The aircraft accelerated to about 150 kts and I recovered low over a cleared field at approximately 200′ and 150 kts of airspeed. Upon switching back to the normal system, I had complete normal operation of the varicam.

Although I did not realize it at the time of the landing, I feel that the PP2P made the landing with



FULL-UP varicam. When the aircraft hit the runway the jolt knocked the varicam beyond the electrical stops rendering the normal system inoperative.

I feel that there are a few things that could have avoided this incident. Number one—the landing *possibly* could have been salvaged and the waveoff not initiated. This I feel is an unacceptable solution. Number two—if the plane captain was in the jump seat during landings and takeoffs involving instructional flights, he would have noticed the warning light in enough time for the IP to make a perfectly normal waveoff on the emergency system, or on the normal system after the varicam was taken off the stops. This is contrary to NATOPS. Number three—a quick check of the varicam gage just prior to touchdown would have revealed a potentially dangerous situation (7 degrees UP varicam on a 20-degree flap landing). The SP-2E varicam gage is in such a position that while landing with reduced power the gage is obscured from the copilot or IP due to the position of the throttles and a very definite break in the scan pattern must be made by the IP to look around the throttles to check it.

Bounce Pattern Near Midair

In preparation for clearing a transport for a night takeoff on one runway at NAS Alpha, FCLP aircraft using another runway were ordered to "Delta."

As the landing gear came up in the transport after takeoff, the 10 percent that never get the word appeared in the form of an errant twin engined tailhooker, bent on the 300′ downwind leg of the FCLP pattern. The transport driver hesitated, gaged the relative motion and pulled back on the yoke. They ballooned over the wings level tailhooker, who was dutifully chugging downwind. The copilot read off the airspeed as the big one went up and over the top, 15 kts from stall speed. But why do this at 300′?

The two pilots exchanged unpleasantries; the tower didn't know what to say and Paddles was also speechless at the time. A UHF comment overheard just prior to letting go the brakes tells the whole story. "Hey, somebody out there is not at 700′."

Should the transport pilot require each aircraft in the pattern to report his position before he trusts the tower well enough to let go the brakes? What is Paddles' responsibility? What is the air controller's responsibility? Recommend that pattern altitude changes be acknowledged by each aircraft or that the tower observe compliance prior to launching cross-traffic if altitudes will be a critical factor.

Editor's Comment: Both Paddles and the tower have radios which must be used at any and all times to retain positive control. These are automatic responsibilities when air collision dangers are present.

I Think I Popped My Chute

A routine A-3B tanker mission turned into a near catastrophe when the bombardier-navigator (B/N) said "I think I popped my chute."

After completion of a night tanker mission we returned overhead the carrier to cover the next launch and recovery.

After several turns in the holding pattern at 15,000′, we made a routine instrument check. The cockpit pressure was a part of this check and it indicated 6000′. The B/N was busy tracking the carrier on radar but at this point he leaned forward and said "I think I popped my chute." I checked his chute; it had deployed and was partially out of the pack. *The D-ring was still in place and the baro-release had not been energized.*

I told the B/N that there was an extra chute in the fourth seat. He took off the deployed chute and handed it back to the third crewman who was attempting to assist him. The third crewman was having difficulty with the bulky state of the deployed chute so the B/N got out of his seat to help. He was standing at the time directly under the upper escape hatch. The third crewman unstrapped and as he moved forward and lifted the chute his helmet hit the emergency upper air bottle handle. The upper hatch blew open and explosive depressurization changed the cockpit pressure from 6000 to 15,000 almost instantly. The escaping air lifted the B/N off the deck, but he quickly locked his arms around the back of his seat to prevent himself from being blown out the hatch with no chute.

I descended to 10,000′ while the third crewman released the air pressure from the upper hatch system and closed it.

The crewman placed the good chute on the fourth seat so that the B/N could strap into it.

We were lucky because several bad things could have happened. The B/N's quick reaction saved him from being blown out of the aircraft without a chute. The deployed chute could have easily been blown out of the aircraft causing damage to the aircraft or injury to the crew.

By this time the launch and recovery was complete and we departed on another night tanker mission somewhat rattled but extremely grateful that no one was injured and no damage was done to the aircraft.

ON THE GLIDE SLOPE

LT Boom Meets RVR

Scene

A naval aviator has just completed a DD175 for a cross-country to NAS, an all-weather master jet air station. He then proceeds to the weather office for a weather briefing. Our play now begins.

Cast

Naval Aviator—LT Boom
Aerologist—WX Chief

LT Boom—"Gotta flight plan here for ya, Chief."

WX Chief—"Yes, sir. Let's see . . . going up to the valley, eh?"

(At this point, the Lieutenant's attention drifts off to other details of the flight as the Chief begins methodically to fill out all the blanks on the weather form and verbally brief LT Boom as he goes along.)

WX Chief—"Okay, let's see what they're doing up there now. According to this sequence report there's a partial obscuration, one-eighth mile in ground fog with an RVR of 2400′."

LT Boom—(Attention returning) "That's interesting. What is RVR?"

Chief—"That's the runway visual range, sir. It's 2400′."

LT Boom—"Now hold on, Chief! If the visibility is *one-eighth of a mile*, how can it also be 2400′, which is close to one-half mile?"

Chief—"Well, sir, (long pause) . . . no disrespect intended, but it appears you slept through your last instrument ground school refresher course."

LT Boom—"True, but I still made a 3.8 on the exam. How can 2400′ equal one-eighth of a mile?"

Chief—"Okay, sir. If you've got about 10 minutes I'll be happy to explain it all to you."

LT Boom—"Sock it to me."

Chief—"Let's begin with a few new terms:

"*Prevailing Visibility* is the horizontal distance at which targets of known distance are visible over at least half of the horizon. There's this cat up in the tower who looks around for barns and trees and stuff like that. He knows how far away these barns and trees are, so he calls the visibility in miles.

"*Runway Visibility Value (RVV)* is the visi-

bility along an identified runway. It can be measured by another cat down on the runway, or by this gadget called a transmissometer. It's also reported in miles and fractions of miles. "*Runway Visual Range (RVR)* is an instrumentally derived value that represents the horizontal distance a pilot can see down the runway from the approach end. It is based on the sighting of *high intensity* runway lights. So you can see, sir, the brighter the lights, the farther they can be seen. Keep in mind that the intensity of high intensity runway lights is adjustable and the RVR equipment takes into account the light setting. For example, when the runway edge light intensity (setting) is increased, the RVR readout increases, and vice-versa. Therefore, the primary advantage of an RVR reading lies in its taking into account the penetrating capability of high intensity runway lights, making it a more realistic and accurate indication of the visual cues which the pilot will have when on, or close to, the runway."

LT Boom—"Verrr—y interesting!"

Chief—"Now, since the RVR is reported in feet, to convert over to miles, you can use this handy-dandy gouge out of the new TERPS manual."

RVR	Visibility (Miles)
1600′	1/4
2400′	1/2
4000′	3/4
5000′	1

LT Boom—"Chief, this RVR and RVV is most informative but how does an aviator apply it?"

Chief—"Well, sir, whenever a visibility value is specified on the basis of RVR or RVV for a particular runway, that visibility will apply for all instrument approaches and for all takeoffs and landings on that runway, *regardless of the reported prevailing visibility of the airport.* For example, suppose the PAR weather minimums for a particular runway are: ceiling 200-½, with RVR reading of 2000′. Conditions are, therefore, below minimums for landing on that runway. However, if RVR or RVV is not available for a particular runway, the ceiling and visibility minimums (200-½ in the example) shall govern. RVR will be reported inoperative, or RVRNO, when either the tranmissometer or the high intensity runway edge lights are inoperative."

If you have a question concerning any phase of instrument flight for which you cannot find a satisfactory answer, send it to the Commanding Officer, VA-127, NAS Lemoore, Calif. 93245.

LT Boom—"Looks to me like just another restriction to keep me from landing at my desired field."

Chief—"Not so, sir! Here is another example which illustrates this applicability. Suppose that tacan straight-in landing minimums at a particular location are 300-1, and the reported weather is 300-¾ with a reported RVR for that runway of 5000 feet. In this case, even though the prevailing visibility is reported below minimums, the RVR for that runway, (5000′), one mile is controlling. Therefore a landing can be made."

LT Boom—"Okay, chief, you've been telling me how useful RVR and RVV can be. Are there any shortcomings?"

Chief—"Well, sir, there is one minor problem, but you can live with it until the system is improved. This limitation is that the RVR is only a sample of the 'real' visibility measured along a 500′ baseline and extrapolates values up to 6200′. Obviously, the visibility may vary along the runway. However, experience has shown that in a large majority of cases, it is representative of the visibility along the entire runway distance. Also, sir, you've got to understand that RVR is not a slant-range visibility along the glide path. It is what a pilot touching down or taking off the runway would see in terms of high-intensity runway lights while in the touchdown area."

LT Boom—"Do tower operators and RATTC controllers know as much about RVR as you do?"

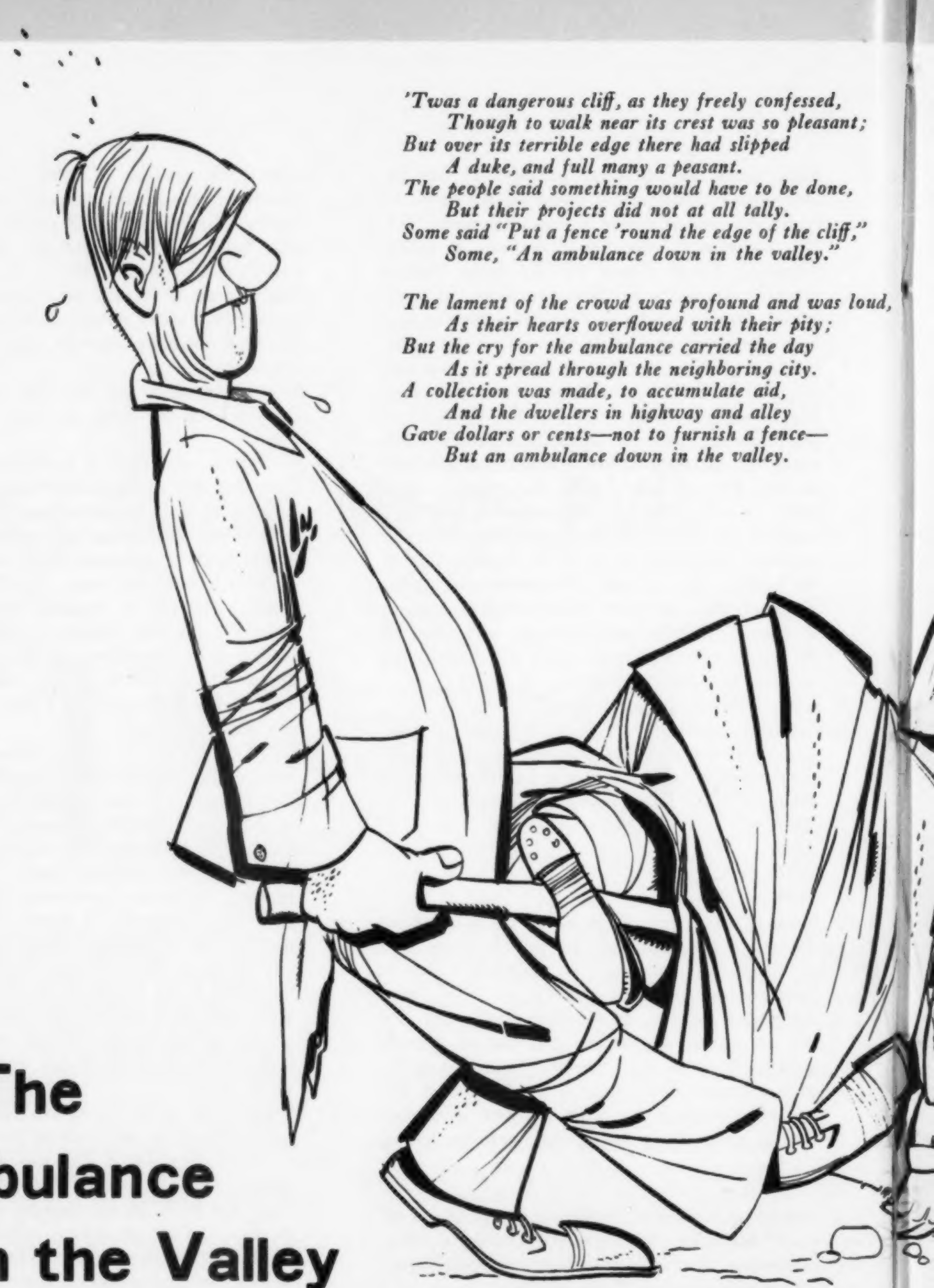
Chief—"Well, let's put it this way, sir. They know enough about it to help you as a pilot, because when the RVR on the landing runway is 6000′ or less and/or prevailing visibility 1½ miles or less, RVR should be reported to the pilots by the tower or approach control in initial contact and subsequently as requested."

(Exit a wiser LT Boom)

The Ambulance in the Valley

'Twas a dangerous cliff, as they freely confessed,
Though to walk near its crest was so pleasant;
But over its terrible edge there had slipped
A duke, and full many a peasant.
The people said something would have to be done,
But their projects did not at all tally.
Some said "Put a fence 'round the edge of the cliff,"
Some, "An ambulance down in the valley."

The lament of the crowd was profound and was loud,
As their hearts overflowed with their pity;
But the cry for the ambulance carried the day
As it spread through the neighboring city.
A collection was made, to accumulate aid,
And the dwellers in highway and alley
Gave dollars or cents—not to furnish a fence—
But an ambulance down in the valley.



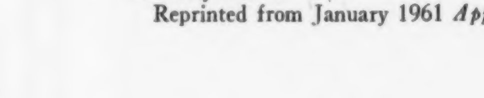
"For the cliff is all right if you're careful," they said:
"And if folks ever slip and are dropping,
It isn't the slipping that hurts them so much
As the shock down below—when they're stopping."
So for years (we have heard), as these mishaps occurred
Quick forth would the rescuers sally,
To pick up the victims who fell from the cliff,
With the ambulance down in the valley.

Said one, as his plea, "It's a marvel to me
That you'd give so much greater attention
To repairing results than to curing the cause;
You had much better aim at prevention.
For the mischief, of course, should be stopped at its source,
Come, neighbors and friends, let us rally,
It is far better sense to rely on a fence
Than an ambulance down in the valley."

"He is wrong in his head," the majority said;
"He would end all our earnest endeavor.
He's a man who would shirk this responsible work
But we will support it forever.
Aren't we picking up all, just as fast as they fall,
And giving them care liberally?
A superfluous fence is of no consequence,
If the ambulance works in the valley."

Courtesy VT-25

Reprinted from January 1961 *Approach*



At the Seventh Joint Services Safety Conference, committee discussions were held on the subject of rescue procedures and equipment. It was concluded that while the recovery equipment of one service may differ somewhat from that of another service, because of missions assigned, more should and can be done toward eliminating equipment incompatibilities and disseminating information on recovery methods to potential rescuees. The following article addresses the latter objective. The author was assigned to research and prepare this article by the Commandant of the Coast Guard. The information presented is intended primarily to supplement aircrew survival training on this general subject of helicopter rescue. However, the author specifically attempted to keep the article basic so that it might have application for non-aircrew personnel relatively untrained in this phase of survival.

Rescue Reminders

By LCDR Robert C. Williams, USCG

Any of us may someday become the specific object of a helicopter rescue mission, the outcome of which may very well determine whether we live or die, or in some cases, whether or not we escape capture by the enemy. The success of the mission could hinge on how well prepared we are to aid the helicopter crew in making the pickup.

Helicopters come in a wide assortment of sizes, shapes, colors, markings and equipment. The recovery techniques and equipment used by the various services differ somewhat because of varying missions. If *you* are suddenly placed in a survival situation, it is most likely that you will not be able to "requisition" the helicopter with which you are most familiar. Simply stated, you will undoubtedly take the first friendly chopper that comes along. Nowhere has the possibility of a random selection been greater than in Southeast Asia where each

service employs several different helicopter models.

Search and rescue professionals from the several services have periodic meetings to determine how they can better serve us. At several recent meetings, committees reported a need for more knowledge of rescue procedures by potential rescuees. SAR people believe that we should learn more about how they can help us and how we can help ourselves. Survival schools and safety publications do their best to keep us informed, but the job is monumental and the degree of individual exposure is not uniform. To improve the odds of survival, it behooves each of us to make an individual effort to learn something of the methods and equipment currently used in helicopter rescue operations. Hopefully, this article will shed some light on this subject which could be of vital importance to any of us.

Helicopter Rescue Equipment

There are numerous rescue devices available to helicopter forces and almost any helicopter can be used as a rescue vehicle. However, the rescue equipment carried by any helicopter will vary somewhat from service to service, unit to unit, and mission to mission. The items listed below are frequently used by hoist-equipped helicopters.

- Rescue sling (horse collar)
- Forest penetrator
- Rescue seat (three-pronged seat)
- Stokes litter
- Rescue basket

Helicopter hoist cables vary in length from about 100′ to 250′ or more. As you will see later, this could be an important factor in determining where *you* are picked up. In some situations, a helicopter crew may be forced to postpone rescue and may drop supplies to aid you until a rescue is possible. It would be impractical to list all such items available for this purpose; however, the following is a representative list:

- Survival equipment (rafts, shelters, survival kits, medication)
- Signaling equipment (visual aids, electronic aids)
- Food (standard and non-standard containers)
- Water (same as above)
- Weapons

The type and amount of equipment available and the containers in which it is packed will vary according to the dictates of the local command.

Helicopter Rescue Procedures

Unit doctrine is paramount in delineating rescue procedures, but certain aspects of helicopter rescue procedures are universal.

A helicopter pilot will normally hover the aircraft into the wind. Though not mandatory in all cases, this procedure is usually desirable. Various techniques can be used to position the helicopter over the survivor into the wind. A circling approach, a teardrop approach, and a 90/270 approach are three such maneuvers. As a survivor, you should understand why a helicopter may fly overhead, then turn away. There is no cause for alarm; just rest easy while the pilot makes his approach.

Don't be surprised if the chopper drops a smoke generator in your vicinity. This technique is often used to help determine wind direction and velocity. A word of caution—don't touch such a device as it may be quite hot.

The altitude at which a helicopter will hover is determined by the weight of the helicopter, terrain, wind, unit doctrine, pilot preference and the length of the hoist cable. Some helicopters do not have a hoist cable long enough to penetrate vegetation over 100′ high. It may be necessary for you to find a new location. In such cases, your physical condition, natural hazards, distance involved and proximity of the enemy will determine the feasibility of this choice. In any case, lacking radio contact with the helicopter, you should try to avoid any action which would cause the helicopter crew to lose sight of you.

In some situations, such as mountainous terrain, the chopper may hover close enough for you to climb onto a skid or into the cabin. Of course, the aircraft will land if possible. Amphibious helicopters may land on the water and taxi to your position with the crewman assisting you aboard a rescue platform.

How to Assist in Your Recovery

The following is a list of things to do and things not to do when being picked up by a helicopter.

1. Don't panic! Remain calm and think. This is the key in any survival situation and easier said than done.

2. Conserve your signaling equipment; have it ready for use, and use it when it will do the most good. In dense jungle, the smoke from a Mk-13 day/night distress flare (the type normally carried in life jackets) may not penetrate the foliage. In this event: (a) tie a cord or rope to a Mk-13 flare, (b) throw the flare over a tree limb, (c) let the flare fall to the ground, (d) ignite the flare and (e) hoist the flare into the tree. A Mk-13 flare will assist the helicopter pilot in evaluating wind conditions. Don't forget your mirror. This piece of equipment is one of the best signalling devices you have.

3. If possible, before touching the hoist rescue device, allow it to touch the ground or water to dissipate any static electricity which may be present.

4. Get out of your parachute before being hoisted!

Rescue slings are known by several names and come in slightly different shapes and configurations. You may hear people refer to this device as a survivor's sling or "horse collar." In general, the rescue sling is a padded, buoyant loop which supports a rescuee across the back and under the arms while being hoisted. The loop is about 3′ long. Some have a chest safety strap as shown in the accompanying photograph. The proper way to get into the sling is as follows:

- Allow the sling to contact the surface before you touch it.
- Grab the sling at the bottom of the loop (opposite the cable hook).
- Steady the sling with the loop flat or horizontal while you put one hand *up* through the loop. This step is important. If you do not put your hand and arm up through the loop from the bottom, you will find yourself in the sling backwards.
- Now put your head through the loop in the same manner—up from the bottom.
- Your other arm must obviously follow the same path. The sling will now encompass your body around your back, under your arms and be positioned so that the cable hook is in *front* of your head or chest. If the cable hook is behind you, try again.
- Fasten chest safety strap (if provided).
- Clasp your hands together and nod your head or give the thumbs-up signal to the hoist operator.

Helicopter rescue sling

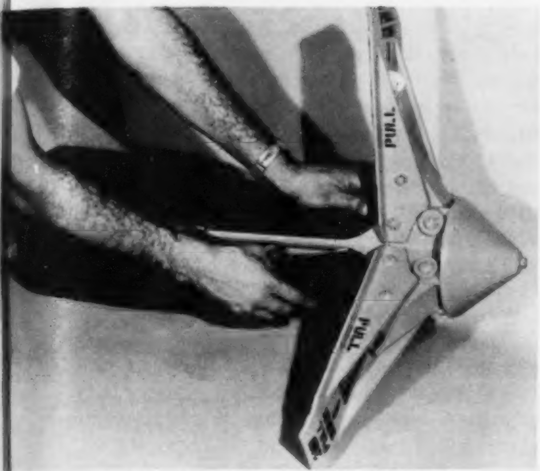
The *rescue seat* (three-pronged seat) resembles a small anchor with three prongs set 120 degrees apart. The shank may have a web belt type safety strap. This is an easy device to use on land but is

Helicopter rescue seat

somewhat more difficult when in the water.

- Allow the seat to contact the surface before touching it.
- Hold the seat upright in front of you.
- Straddle one or two prongs.
- Put the safety strap (if provided) around your body as you would the rescue sling and pull it tight. The strap is often used for when a survivor is incapacitated. In such a case, another survivor or a rescue crewman will assist in rigging the strap. (If the helicopter crew assumes that you are not incapacitated, they may lower the seat without the strap.)
- When you are securely on the seat, hang on and give a signal to indicate that you are ready to be hoisted.
- Keep the seat close to your crotch and keep both arms around the shank.

The *forest penetrator* is rapidly becoming the primary military hoist rescue device. This piece of



Old style forest or jungle penetrator

equipment is basically a rescue seat with folded prongs and a weighted nose. The earlier Navy version incorporated a flotation collar around the shank. To use this equipment, proceed as follows:

- Allow the penetrator to contact the surface before you touch it.
- Go to a kneeling position—it is awkward to hold the device and get into it from a standing position.
- Hold the penetrator upright in front of you and pull down on the velcro tape. Remove the safety strap from the protective cover. Do not unhook the strap. Put the safety strap around your body as you would the rescue sling and pull it tight.
- Pull down two seats with one seat under each leg.
- Give the thumbs-up signal.
- Hold on with both arms around the shank. Keep the penetrator close to your crotch and your head and shoulders close to the cable.
- When two men are being hoisted at the same time, one man gets on the penetrator as previously described, but uses only one seat. The other man sits on two seats with his legs resting over the first man's legs. Each holds on to the other. If both are injured, the more seriously injured man should be placed on the penetrator last.
- It is possible to hoist three men at one time (obviously, each man uses only one seat).
- Remember to put the safety strap on first. In an emergency, such as when under attack, the helicopter crew can hoist the survivor by the strap alone.

Editor's Note: Since this article was written, the Navy has gone to the Billy Pugh (BP) jungle penetrator which has a fiberglass umbrella for protection of the survivor's head and shoulders during hoist through jungle foliage. The BP jungle penetrator has a two prong seat. The folding umbrella is opened by actuation of a lever. The BP penetrator will not float and, according to the Aerospace Crew Equipment Department, is not recommended as a water pickup method. (See May APPROACH, p. 29.)

The *Stokes litter* is a special type of stretcher frequently employed in helicopter rescue operations. It consists of wire mesh attached to a metal frame and is used to hoist litter patients. If you are required to assist in a Stokes litter pickup, follow these procedures:

Rescue litter

- Allow the litter to touch the surface before you touch the litter.
- Unhook the litter from the hoist cable hook. *Do not fasten the hoist cable to anything on the surface.* Helicopters don't fly well at anchor.
- Lay the suspension cables on the deck or ground alongside the litter.
- Unfasten the safety straps.
- Place the patient in the litter. If the patient is on a stretcher, remove him from the stretcher before placing him on the litter.
- Secure the safety straps.
- Place the two lifting rings (attached to the suspension cables) together over the center of the litter and snap them into the hoist cable hook.

- Do not put any equipment in the litter with the patient.
- Signal the hoist operator that the patient is ready for pickup.
- Steady the litter until it is out of reach. A steadying line may be attached to one end of the litter. It is recommended that "ground" personnel use such a line to steady the litter during ascent.

Devices which may be available in the future include an improved plastic litter.

A *rescue basket* is a device made of wire mesh on a metal frame and is ideal for hoisting untrained persons for they need only sit in the basket. The rules for using the basket are simple:


Rescue basket

- Allow the basket to contact the surface before you touch it.
- Sit in the basket. Do not stand up while being hoisted.
- When ready to be hoisted, signal the hoist operator.
- Remain seated until the basket is in the helicopter.

Rescue Net: The Navy expects the X872 helicopter rescue net will eventually, along with the BP forest penetrator, replace the Navy's rescue seat and rescue sling. (See opposite page.)

Rope: If a helicopter lowers a rope, *do not climb it!* Tie a loop in the rope and use it as you would a survivor's sling. Be careful not to make the loop too large and do not tie a slip knot. The crewman in the helicopter probably will not be able to pull you in hand-over-hand; for this reason, don't be surprised if the helicopter flies away with you still hanging in the loop. The pilot will locate a safe place to put you down and will then land so that you may enter the aircraft. This procedure will only be used in an emergency when there is no other alternative.

Finally, here are two important things to remember about helicopter rescue:

- When being hoisted, keep your hands away from the hoist cable swivel. It will spin rapidly as tension is placed on the cable.
- Always allow the crewman to pull you into the helicopter and take you out of the rescue device. The hoist operator may turn you so that you are facing away from the helicopter before pulling you inside. Just hang on until you are told how you can help.

Well, there you have it. Some of this material may be old hat but don't leave it on the shelf. Take it out and dust it off now and then—*you* may have to wear it!

One rescue device which was not mentioned in the accompanying article is the Chicago Grip, also known as the Come-Along. It is a device with an attachment on one end which is hooked to the D-ring on the torso harness of the rescuee. The other end is then attached directly to the hoist cable at any point above the rescue seat or harness. In this manner, an incapacitated pilot and a rescue crewman who goes into the water to help him can be retrieved simultaneously.

Helicopters, being the peculiar breed they are, make it possible for any external hoist-configured aircraft to be diverted to a rescue mission. Therefore, it would seem wise to be well prepared for such an eventuality. A locally manufactured rescue kit should include, but not be limited to, two blankets, two plastic inflatable splints and a plastic mouth-to-mouth breathing device. All items are easily procured, are lightweight and can be conveniently stowed in any helicopter.

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NEW Rescue Net

The rescue net with its sea anchor trails below helo.
The survivor above was photographed at the moment of pickup.
The survivor is hoisted to the aircraft.

A new piece of rescue equipment has been added to the Navy inventory: the X872 helicopter rescue net. This net will replace the rescue sling or horse collar and the rescue seat for UH-2, SH-3 and H-34 aircraft engaged in rescue operations. (Air Crew Systems Bulletin 146, reprinted in its entirety in Personal/Survival Equipment *"Crossfeed"* 4-68, refers.)

Extensive field tests of the new rescue net have shown that it significantly reduces helicopter hover time in sea and open land area rescues of both mobile and immobile rescuees. The net also can be used in slow forward flight to pick up mobile rescuees at sea and in open land areas. The net can carry two people at one time and can be used for personnel and light cargo transfer. For cargo and personnel transfers, it is recommended that the drogue line be removed from the net to prevent entanglement in ships' life lines, etc. The net assembly includes a detachable light cargo net retaining door which attaches to the net opening by means of four signal halyard snaps.

For pickup with the rescue net the survivor, after ridding himself of his parachute and leaving his raft in the case of a water rescue, simply enters the net, sits in it, and is hoisted to the aircraft. In forward flight in the net, the survivor will automatically be forced against the back of the net by gravitational forces. At the same time, the open portion of the net will rotate so that the survivor faces aft. The survivor may be trailed through the air at speeds up to 60 kts. The net provides excellent security for the survivor and is considered by field evaluators to be a safety improvement over current rescue devices.

Overland pickups in open areas may be accomplished at forward speeds up to 20 kts but this type of pickup operation requires smooth terrain and extensive training of both rescuee and helo crew.

The design of the helicopter rescue net provides a stable work platform which permits the rescue aircrewman to use both hands in bringing an immobile rescuee aboard the net. For pickup of immobile rescuees, it is recommended that the rescue aircrewman ride the net down to the water or land.

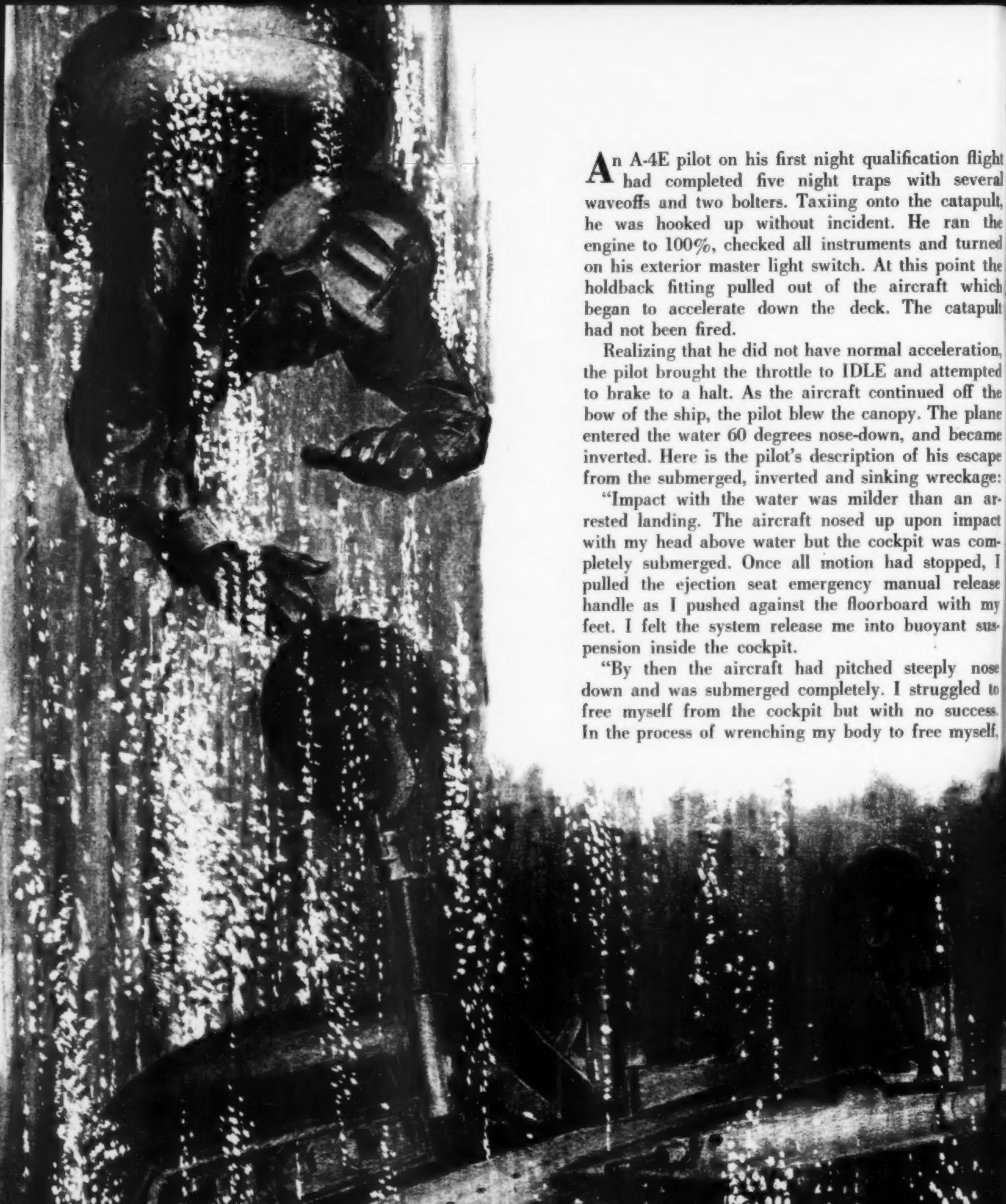
The rescue net weighs 20 lbs. It has a conically shaped, bird cage appearance and is open on one side. The opening is 59″ in length; from 49″ at the bottom it tapers to a 20″ width at the top. When the net is trailing or in the water, its opening is stabilized by a 2½ lb sea anchor or drogue. The drogue has a forward diameter of 12″, is 9″ long and has a 6″ diameter at the rear. A 10′ drogue line is provided with two signal halyard snaps. One halyard snap permits complete removal of the drogue; the other permits reduction of the length of the drogue line to 5′. The 5′ length is used in moderate sea states; the 10′ length is used when high sea states are encountered. The drogue also keeps the net from skipping off the waves.

The net is provided with a hinged standup device which automatically forms a rigid cage when the net is fully extended. Foam plastic floats are provided to allow the rigid upper portion of the net to project about 17″ above the water.

The net must not be launched empty from the aircraft at airspeeds in excess of 40 kts. When using the net for light cargo operations, extreme care must be taken not to overload the helicopter hoist system beyond the designed operational limits.

Net specifications are as follows:

- Net construction—5/16″ polypropylene line, tensile strength 1200 lbs.
- Foam floats—Ethafoam
- Metal construction—stainless steel
- Overall net strength limitation—1400 lbs.
- Folded net dimensions—49½″ x 34½″ x 6″
- Extended net dimensions—59″ x 49½″ x 34½″
- Total weight—20 lbs.



An A-4E pilot on his first night qualification flight had completed five night traps with several waveoffs and two bolters. Taxiing onto the catapult, he was hooked up without incident. He ran the engine to 100%, checked all instruments and turned on his exterior master light switch. At this point the holdback fitting pulled out of the aircraft which began to accelerate down the deck. The catapult had not been fired.

Realizing that he did not have normal acceleration, the pilot brought the throttle to IDLE and attempted to brake to a halt. As the aircraft continued off the bow of the ship, the pilot blew the canopy. The plane entered the water 60 degrees nose-down, and became inverted. Here is the pilot's description of his escape from the submerged, inverted and sinking wreckage:

"Impact with the water was milder than an arrested landing. The aircraft nosed up upon impact with my head above water but the cockpit was completely submerged. Once all motion had stopped, I pulled the ejection seat emergency manual release handle as I pushed against the floorboard with my feet. I felt the system release me into buoyant suspension inside the cockpit.

"By then the aircraft had pitched steeply nose down and was submerged completely. I struggled to free myself from the cockpit but with no success. In the process of wrenching my body to free myself,

I noticed that my oxygen mask was full of water. At the time I thought that pulling against the hose had loosened it, thus allowing the water in, so I unsnapped the left side of the mask.

"The plane was now inverted and sinking rapidly. Realizing that some other method must be employed, I tried to undo my lap rocket jet fittings but my wet gloves made this impossible. By taking off the gloves I was able to undo the rocket jet and Koch fittings with my bare hands.

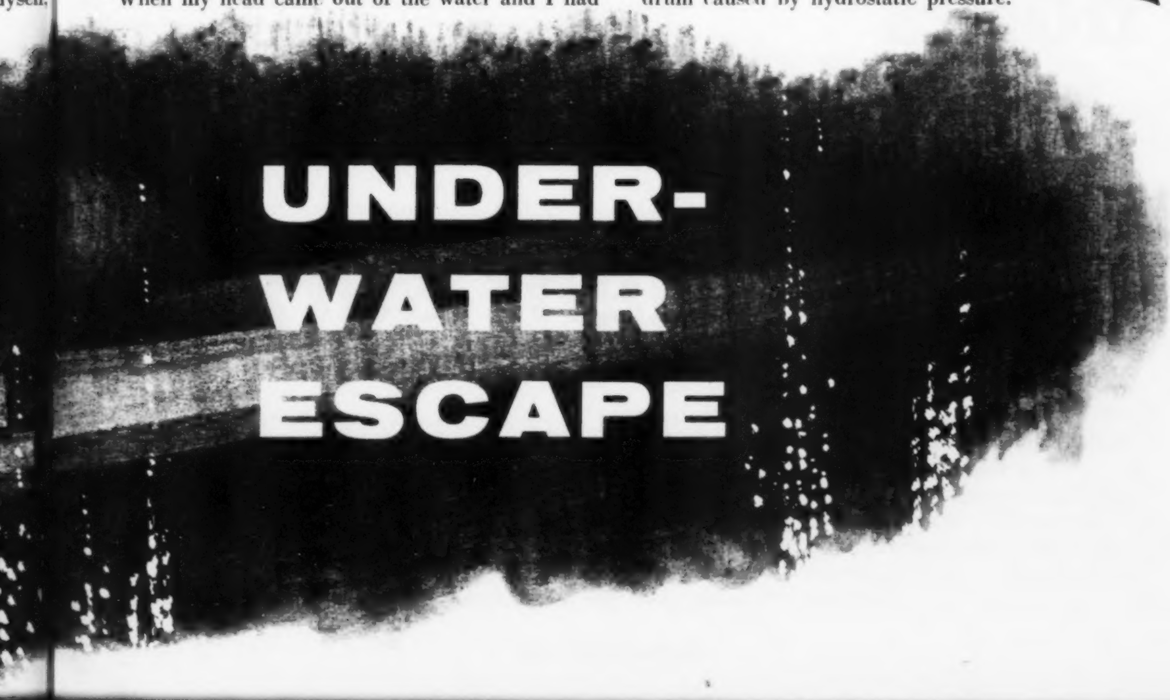
"Since the plane was inverted, I was pressed upward against the floor board and seat from buoyancy. This aided in freeing my legs from the tunnels under the instrument panel so that by putting my lower arm over the windscreen bow I was able to pry myself far enough out to be able to get my right shin on the windscreen bow and further aid my exit. I passed around the right side of the nose and determined that I was clear of the aircraft. I then inflated the Mk-3C and slowly came to the surface. The Mk-3C did not inflate well at all at the initial depth but as I got near the surface it inflated rapidly.

"My feet came out of the water first. I was aware of the fact that I was upside down as I floated to the surface but I did not want to disturb my equilibrium or ascent rate. I had no strength left to move anyway.

"When my head came out of the water and I had taken in some air, I looked around 45 degrees to my left and saw the ship. (I had held my breath for so long that I was faint and could not see initially.) I saw numerous articles about me: an orange smoke flare, some colored wands and some helmets. Then I heard the helicopter overhead. The SH-3A had several floodlights lighting up the area of the floating drop tank which had broken off from the aircraft. I got a signal flare from the right side of the Mk-3C and located the night end. As I did this, the lights from the SH-3A fell on me and it was obvious that the crew had me in sight. I then dropped the unlighted flare in order to get the rescue seat. However, the helo veered to my right at the last moment and circled around for another try. This time I tried to get my strobe light out of the pouch on the torso harness but was unable to do so due to the pressure exerted against it by the inflated Mk-3C.

"On the second attempt, the helicopter picked me up with the spotlights as soon as it turned toward me. The seat was still suspended and at the last moment it was dipped into the water. I got on it in the proper position with no difficulty and the crew hoisted me aboard promptly."

The pilot's only injuries were bruises of the legs where he struck the windscreen and a ruptured ear drum caused by hydrostatic pressure. ◄



UNDER-WATER ESCAPE

The steel tip of the left boot (above) was almost entirely cut off and the steel plate was knocked out when the wearer, an A-4B pilot, struck the cockpit during ejection. His feet were on the rudder pedals (as prescribed by NATOPS in a controlled ejection). His only injuries were very minor abrasions of his left foot and knee. His insignificant foot injury despite the condition of the flight boot is testimony to the protection it afforded, the investigating flight surgeon reports.

notes from your flight surgeon

Condition and Survival

KEEPING well and physically fit is always important, but it is especially important to the man on his own in a wilderness. The person who is physically fit when he begins his survival operation is more likely to come out alive than the one who is not. He will not only be more able to meet the added demands on his physical strength but he will stand less chance of contracting a local disease as well.

Don't let your condition deteriorate after you abandon your airplane. You need all your energies to survive, and if you lose part because of disease, you lower your potential to survive.

Whether you're stranded on land or sea, you can maintain enough physical activity to keep you in physical and mental trim.

Pay particular attention to your extremities and your abdominal muscles. Stretching the arms above your head, opening and closing your hands, bending your trunk forward and back, flexing the ankles and toes and twisting the body are examples. You can improvise others but do your exercises slowly and regularly for short periods of time to avoid increasing your demand for food and water.

—Navy Survival Training Guide (NavWeps 00-80T-56 Rev 61)

Helmets

THE two pilots in a UH-34D lost their APH-6 helmets on impact because their chin straps were not tight and/or their nape straps were not fitted properly.

The crew chief in the same incident was struck on the back of his APH-5 helmet, most likely by the lower part of the starboard strut coming through the side of the aircraft. Although the blow, coupled with a loose chin strap, tore the helmet from his head, the helmet probably saved his life.

Fallacious Attitude

FROM an AAR endorsement: "There is an observed tendency in Vietnam operations to attach to routine operations a sense of urgency that is frequently false and is sometimes artificial. Others take the view that, since they are operating in a combat zone, risk taking is both acceptable and required. Such attitudes are fallacious in the extreme, may void successful completion of a mission and are inconsistent with proven Navy operating practices. A case in point is the failure of this crew to wear adequate survival gear. This crew was well-trained and thoroughly briefed. The lone survivor states that, due to the heat and the discomfort of the gear, it was not worn. Although the lack of survival gear was not a factor in the death of the pilots, it must be noted that had this emergency occurred over land with a successful crash landing, the entire crew would have abandoned the aircraft without radios, flares and other survival items."

—Squadron C. O.

Last Day

"I THINK the crew of the destroyer was as happy to see me as I was to have them there. That day was their last day on the line before going back to the states and I was their first and only customer in seven months. A man was sent over the side and a seat lowered. I was raised aboard with no difficulty."

—Pilot after ejection

Positive Approach

APPROXIMATELY 95 percent of the aircrew personnel of a VP squadron have completed water and swimming survival training, its safety council reports. Oxygen training using the aircraft oxygen equipment has been initiated with several crews in conjunction with the current crew NATOPS program. Special attention to newly-arrived flight crew personnel, many of whom have not attended the replacement training squadron, will be required prior to assigning them to the tactical organization. The survival officer has taken action to ensure training is accomplished.

Wear It!

COMMENTING on an accident in which the lone survivor, with neither life vest or helmet, managed to climb into an inflated life raft until rescue 30 minutes later, the investigating flight surgeon says: "Safety equipment is of no avail if not used prior to mishaps. The goal is prevention of avoidable injuries and to leave very little to fate. Therefore, it is recommended that all safety personnel reiterate to their units that safety equipment be worn when required for through such action unnecessary loss of life may be avoided."

Sleeping Pills

RECENTLY we saw a very anxious and apprehensive young man complaining of dilated pupils, inability to read and focus on near objects, dry mouth, flushed skin, pounding heart and dizziness.

"Have you taken any medications?"

"No, sir! Just some sleeping pills I bought over the counter at the drug store."

This supposedly harmless, well known compound contains scopolamine and was responsible for his difficulties. He recovered in a few days just by discontinuing the drug.

Just because medicine is sold without a doctor's prescription does not mean it cannot be harmful or even disastrous when used in aviation.

—LT Richard E. Carlson, MC Flight Surgeon, VR-21

Relaxed Requirement

WHEN a bird shattered the nose observer window of an OP-2E, the observer received multiple cuts on his face and right shoulder. The squadron C. O. reported that the injured crewman was not wearing his helmet with visor down. This, he stated, contributed to the extent of the crewman's injury.

All crewmembers are now required to wear helmet and visor, a requirement which had been relaxed due to extremely warm weather. ◄

Ordnance Installation & Maintenance

Combat military aircraft are basically designed to carry ordnance which, theoretically, will hit the enemy and annihilate him.

A long chain of events must happen in a specific sequence to make this subtitle come true. It takes the failure of only one link to nullify the total effort.

When a piece of ordnance is first designed, it is subjected to a research and development phase to ensure that it will work consistently as intended. Program testing includes all required associated equipment such as bomb racks, electrical release circuits and fuzing safety for installers and dispensing aircrewmen alike. Consequently, when aerial ordnance is finally certified for production and ultimate issuance to fleet activities for operational use, it will be safe 99 percent of the time if pertinent instructions are followed. Unfortunately, the remaining one percent of unsafe operations is often expanded into greater degrees of danger because of a breakdown of supervision and individual negligence.

One article such as this can not erase all of the unsafe problems but by constantly reminding individuals of pitfalls, the dangers can almost be eliminated by common sense.

Where It All Started

Aerial ordnance had its beginning in World War I and the first weapon was the machine gun, adapted from infantry use. The early installations were strictly of the Rube Goldberg variety, and malfunctions were common. By the time World War II commenced,

Machine guns on a WW I fighter

machine gun installations were specifically engineered for each model aircraft. Unfortunately, even the best mechanisms in the world will not work as designed unless they are maintained according to precise instructions.

Incomplete Fix Job

An F-8C squadron was engaged in conducting accelerated gunnery practice for its pilots. One of the 20 mm guns installed in one *Crusader* was discovered to have a clearing rod broken off in the barrel when being reloaded for the next sortie. Dutifully, the ordnancemen removed the gun and took it to the shop to be fixed. Before the job could be completed, however, the men were relieved by another crew and all concerned neglected to pass the word.

The new crew apparently conducted a very weak inspection of the gun and thinking that all was in order, reinstalled it. The very trusting pilot blasted off for his scheduled practice and when he pulled the trigger, the barrel exploded. Fortunately, the damage was confined to the gun bay and the pilot was able to land the aircraft safely.

An F-8 loaded for bear

What Do We Do With the Leftover Parts?

Another *Crusader* squadron pilot let up on his trigger during a strafing run because he detected noises abnormal to gun firing coming from the gun bay. After a safe return to base, inspection revealed that the upper 20 mm machine cannon had come loose from its mount and had caused damage to the aircraft's intake duct.

The cause was traced to a missing ring retainer assembly. A modification team had recently reworked the gun installation and there was strong circumstantial evidence that they had done an incomplete job. The squadron's other F-8Hs were checked and the final tally was shocking. Seven aircraft had: 4 gun retainer rings loose or not installed; 11 detent pins either of the wrong type, loose or not installed; 10 cotter pins of the wrong size or missing. Four

guns also had lock-wiring installed in lieu of specifically designated cotter pins.

'I Didn't Know the Gun Was Loaded'

Many of us first learned some gun-sense in our younger days. One of the most important points learned was never point a gun at anyone or anything, loaded or unloaded, unless you intend to shoot him or it. Regardless, through the centuries since the gun was first invented the number of people killed under accidental conditions must be in the millions. In spite of the advantages of modern gun safety features included in modern gun designs, accidents of this type still happen with regularity.

The crew of a CH-46D was recently conducting gunnery practice with their .30-caliber side-mounted machine guns. The port gun jammed and after the removal of one round, it was tried again. It still would not fire so the gun was removed from its mount and brought inside the aircraft for more detailed checking. When the pin was removed from the trigger group, the bolt went home and—you guessed it, the round fired. Fortunately, no human or vital aircraft spot was hit but the bullet went through a life vest and the cargo rail extension and stopped in a cargo tie-down strap.

For the umpteenth time, remember: *unloaded* guns you may think are unloaded have a habit of firing sometimes. Check and doublecheck.

How Does the Powder Ignite?

Since there is a degree of mystery surrounding the explosive capabilities of ordnance, many people are tempted to conduct their own unauthorized experiments. One young lad wanted to find out how strong a hammer blow would be necessary to explode a .50 caliber bullet. He secured the bullet in a vise and started striking it with successively harder hammer blows. The first two blows did nothing but the third put him in the hospital.

Very recently, another inquisitive young man decided to experiment with ways to ignite powder taken from a 20 mm shell after the bullet was removed. He thought he was using adequate safety precautions by pouring the powder inside the barrel of a 20 mm cannon. After all, the barrel makes it safe to fire bullets so why shouldn't it be good protection for the experiment? Well—something went wrong and two men were critically hurt and another sustained minor injuries.

Improper maintenance can lead to undesired explosions.

In a Hurry to Get Home

It would seem that ordnance accidents come in many varieties, partly because there are many types of weapons. An incident similar to the *unloaded* gun firing occurred recently in a P-3A. The aircraft had been on an ASW exercise and a Mk-25 marine marker was put in the retrolauncher toward the end of the hop. Last minute changes to hurry home

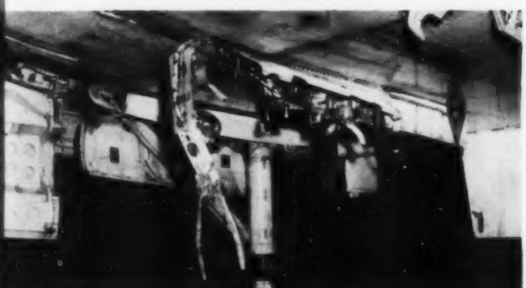
caused the round to be left (unexpended) in the chamber against squadron SOP. No more thought was given to the matter as the aircraft was secured at home base.

When a new crew was preflighting the *Orion* for their hop some time later, they cut short a few important steps. One area that was not properly checked was the retrolauncher barrel. When the firing circuit was energized it checked out as advertised and more realistically than desired. The forgotten marine marker shot out of the aircraft, smashed through a hangar window and shattered on a metal locker. Fortunately, no one was in the way of the missile.

Early Bomb Troubles

Bombs quickly joined guns in the aerial weapons

Dig those crazy bombs



Faulty bombrack installation results

arsenal of World War I. The first bombs were hand grenades hand thrown over the side by the aircrew. Unfortunately, the hard to handle grenades probably killed more aircrewmen than enemy ground troops. The next step was to adapt artillery shells for the job. A somewhat amusing story has evolved from one such type of early bomb. It seems that the explosive was modified so that the fuze timing of one minute was set in motion by the same cable which was supposed to have released the bombs.

One particular two-seat bomber was flying along on a mission about 500′ over the enemy trenches. At the target the pilot pulled the cable to salvo all of the crudely configured delayed action explosives. The rear seat man (who manned the protective tail machine gun) observed that the bombs did not separate from the plane, and he yelled the information to the pilot. The pilot immediately recognized that he had a few seconds less than a minute to do something—but what could he do? Neither man had a parachute (chutes were not common in World War I) so a bailout was not yet an aviation technique.

Fortunately, the rickety biplane did not cruise much faster than landing speed so the quick thinking pilot dove for a pasture in no-man's-land. In less than a minute the plane's wheels were rolling slow enough for the crew to leap out and start bettering the Olympic record for the 75-yard dash. Did they make

Skyhawks pack a wallop

it? The old timers say no but their epitaphs include credit for being the world's fastest humans over a short distance.

As opposed to other types of aircraft maintenance, ordnancemen must be particularly safety conscious because almost all of the basic items they deal with have varying degrees of explosive power.

Early Bomb Racks Were Basically Simple

Through the years, aerial bombs have not changed much. Regardless of size, they are hung on a bomb rack and after the fuze is installed, they are ready to be dropped. By having adjustable sway braces installed, most racks can become quite versatile. In

addition to many sizes of bombs, they can accommodate rocket and machine gun pods, individual rockets, missiles, flares, or external fuel tanks.

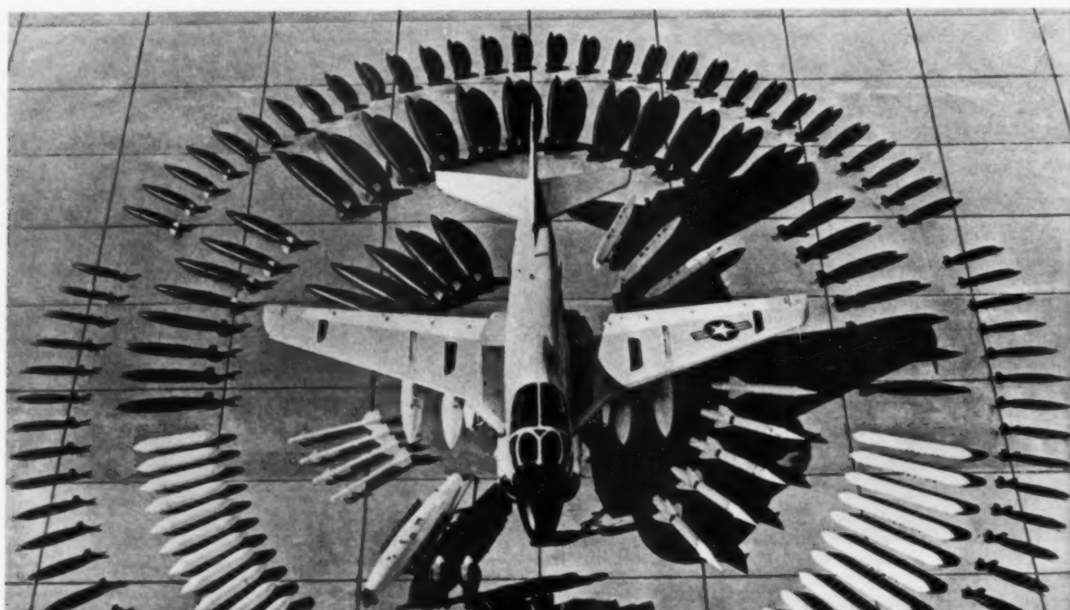
Unfortunately, there have been many mishaps due to improper sway brace adjustments. To cite one of many, a bomb canister was attached to a *Cougar's* Mk-51 rack. The sway brace lugs were not torqued in accordance with the instructions for the particular store. Enroute to the target, the *Cougar* encountered rough air and the canister separated from the aircraft. Fortunately, it fell in an uninhabited area.

Rockets Enter the Inventory

Aerial rockets came into common use on aircraft toward the end of World War II. Their appearance caused considerable changes in ordnance safety rules because they contained a double explosive hazard when compared to bombs and guns (the two main types of ordnance used up to that time). Not only did rockets have a warhead that detonated but their propulsion motor was also a potentially dangerous explosive. Since they were fired electrically by the pilot from his remote position in the cockpit, stringent installation safety rules had to be established. This was because electrical circuits have a habit of retaining a trace of residual current under odd conditions; and when a rocket is plugged in, the smallest amount of residual electricity can ignite the rocket motor. Result—casualties to the ordnanceman installing the weapon.

'Who Fired That Rocket?'

To illustrate just how sensitive rocket motors are, a load of 2.75-inch FFARs were being transported on a truck to the flight line. While the truck was creeping along, one of the rockets ignited. It went



Ordnance varieties on the F-4

through both sides of an adjoining building and a fragment damaged the vertical stabilizer of an aircraft parked nearby. The only plausible explanation for the mishap is that a static discharge from the vehicle or some other source of RF energy triggered the projectile.

For detailed information on this subject, review film MN 9682, HERO (Hazards of Electromagnetic Radiation to Ordnance) available from your nearest Training Aids Library—Ed.

Aerial Ordnance Dispensing Circuitry Gets Complicated

After World War II, the aerial ordnance state-of-the-art was stalemated so that in the first year of the Korean unpleasantness there was no improvement over the 1945 techniques. Before the conflict was stopped, however, programs were underway to develop an amazing variety of new aerial weapons.

Most of the new items were designed to be launched or dropped from external under-the-wing mountings. Consequently, multipurpose bomb racks became a requirement. To achieve maximum versatility, new aircraft became electronic nightmares in the area of cockpit-to-bomb-rack circuitry. Under such conditions it is no wonder that ordnancemen occasionally get confused about which circuit is which. One has only to study the accompanying picture of the A-6A surrounded by its stable of weaponry to envision the complex circuitry required to operate each individual weapon.

To further illustrate the ordnanceman's dilemma, a few of many mishaps are herewith condensed for consideration and study.

Which Plug for Which Weapons?

An A-7A had just completed an aerial refueling mission with a D-704 buddy store on station No. 1. The schedule for the next flight called for the D-704 to be removed and for the same station to be modified with a TER to hold a LAU 32B/A rocket pod. Unfortunately, the circuitry was not properly altered to fit the new job. The weapons station control junction box cable, PN P394 was not switched from the J324 plug (fueling store control) to the J326 plug (J-box control). So what's new? Anyway, as a result of this oversight, the firing impulse did not go through the junction box. The conventional weapons check list for rockets (NavAir 01-45AA-75-12), page 3, item 4C, requires the junction box cables to be properly connected. The loading crew did not insure proper connection of the junction box cable to the No. 1 station.

The end result of this confusion was that the entire LAU-32B/A rocket pod dropped away like an impotent bomb, with its rockets all still very neatly packaged and harmless. If it had been a real combat mission, the enemy would have hardly been bothered.

More Switch Confusion

An ordnanceman in a A-4C squadron was assigned to check for possible malfunction of the PMBR on a particular *Skyhawk's* center station. He was not careful with his cockpit manipulations and inadvertently flipped the switch which jettisoned the external fuel drop tank. Investigation revealed lax supervision as well as negligence on the individual's part. The aircraft was not in an area authorized for such work and the aircraft's drop tanks did not have their ground safety pins installed.

Ordnance Safety Leads to FOD

An F-4J pilot started his engines to proceed with a Mk-76 practice bombing hop. Then the ordnanceman, in accordance with squadron SOP, performed a stray voltage check of the LAU/17A pylon. No current was evident so he then removed the electrical safety pin. He then walked forward to the port side of the *Phantom II* to visually show the pilot the safety pin which would be *proof-positive* that the check had been completed. Unfortunately, the pin was attached to a long lanyard which was sucked into the idling port engine with such force that it jerked the pin from the man's hand. End result—engine change.

One can see from this collection of ordnance mishaps that it is a wide open field for trouble. A mishandled piece of ordnance can be most unforgiving and you had better learn everything you can about it or get in another line of work. Fortunately, ordnance is easy to understand if one will take the time to study the pertinent directives. ◄

NOTES

and comments on maintenance

Compass Rose—And Thorns

A PILOT and two maintenance men were assigned to swing the compass of a TF-9J. While the pilot was taxiing the *Cougar* to the compass rose, the two men preceded him in a pickup truck. They parked it on the stabilized shoulder near where the plane was to be positioned and got out to direct the pilot.

The first attempt to position the aircraft on the compass rose was unsuccessful due to poor coordination and some misunderstanding between the pilot and the two taxi directors. Consequently, the pilot added power to move the *Cougar* around to the left in a new position attempt. The exhaust and debris caused the two directors to turn their backs for protection and the pilot was without their very necessary help for a few moments. In that short time, the right wing tip struck the too-closely parked vehicle, and the truck then spun around so that its rear end smashed the extended fuselage speed brake.

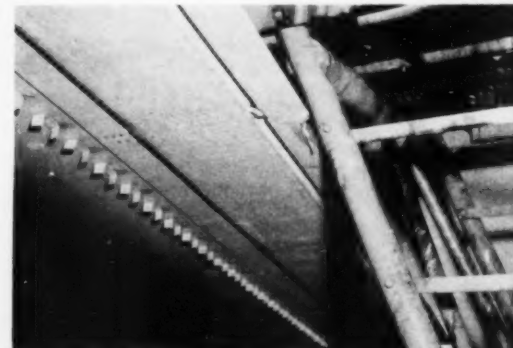
Wing tips are easy to damage and hard to fix.

Speed brakes are equally damageable.

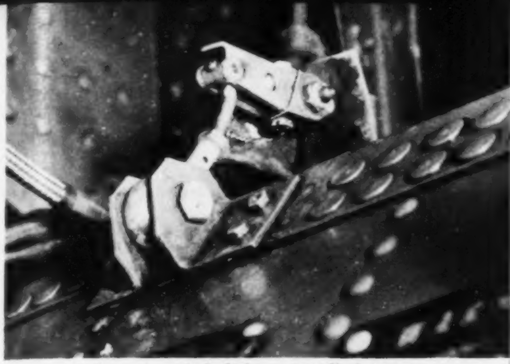
Vehicle drivers must remember that planes are designed to fly and their ground handling qualities are not as good as an automobile or truck. Additionally, pilots must insist on sufficient vehicle clearance at all times. If the vehicle is too close, stop moving the aircraft and insist on its being repositioned.

Who Done It?

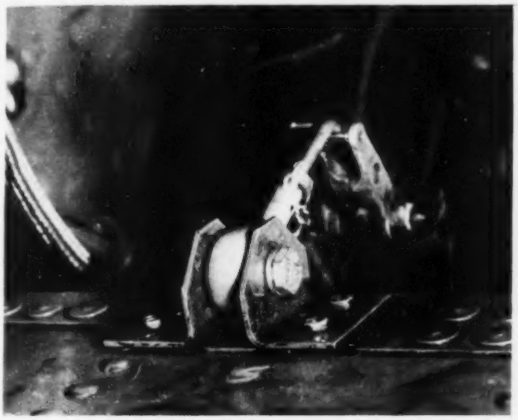
AN S-2D was in the hangar for some maintenance. The next day the inspector noticed a damaged balance tab on the port elevator. After more sleuthing it was determined that the damage had been done by the high ladder checkstand nearby. No one admitted to being the culprit who had pushed the stand into or away from the wing.


Damage was traced to a workstand.

This mishap is presented with the idea that it might be a helpful reminder to maintenance crews to properly stow and secure support equipment after maintenance.



Aux air switch linkage installed 180 out.



Correct installation of linkage.

F-4: Connect Switch Arm As Shown

WHEN an F-4J aircraft was inducted into calendar inspection, the aux air door switch link rod (PN EN-12366) and actuator were disconnected as a personnel safety precaution.

Upon completion of the aircraft inspection cycle the aux air door link rod was reinstalled incorrectly.

It was discovered that the aux air door switch link rod could easily be rotated 180 degrees due to the threaded rod end and swivel fitting on the switch arm thus allowing the rod to either bend or break when the door closed.

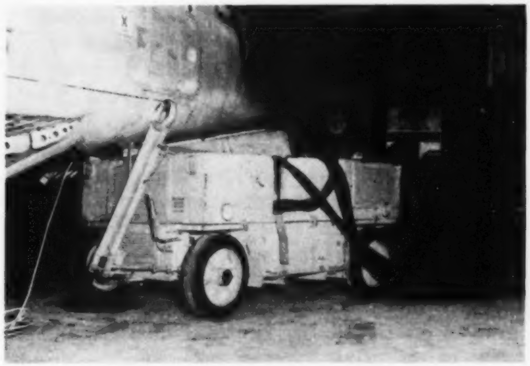
Can you pick the right installation?

—Contributed by LTJG C. E. Snodgrass, VF-121

Note: F-4J operators ensure that the warning plate (PN 32-891878-3) is mounted on the aux door vice the warning plate (PN 32-819873-3). Fig: 6-11 at NavAir 01-245 FDB-2-3-2 refers.

Servicing Cart Dominoes

A QUALIFIED driver steered his tractor between two aircraft parked in the hangar. The standard tow-bar was attached behind the tractor and, unknown to the driver, it snagged the power cable of a mobile generator which was plugged into the adjoining F-8C. This caused the MMG-2 to whip around and smash into fuselage underside. Result, extra man-hours to repair the *Crusader*.



Crunch prevention requires alert operators.

Transient Service Note

Did you know:

That an all-out effort is required of the entire aviation community (Naval Shore Establishment) to reduce the time that combatant aircraft are in a nonoperational status such as awaiting ferry, in transit or in rework?

That aircraft service and repairs must be provided during and after normal working hours?

That air stations are required to furnish maintenance support on a 24-hour basis?

That the flight crews of these aircraft must be furnished transportation to and from adequate quarters and messing facilities?

That the number of people in a ferry crew varies with model aircraft to insure economical and safe practices?

That aircraft ferry service; responsibilities and procedures for; have been updated?

That the latest information on this subject is contained in OpNav Inst 3710.6E?

That this instruction is applicable also to Naval Reserve and Marine Corps?

That if transient service at your station is up to par, this is old but good dope?

Murphy's Law explicitly states: "If an aircraft part can be installed incorrectly, someone will install it that way." One-way check valves seem to have an acute affinity for upholding the law in nearly all systems.

Those One-Way Check Valves

Because of their small size and being fitted with identical thread sizes at each end, the check valve is subjected to misinstallation perhaps more than any other type of fitting in the aircraft's various pneumatic, hydraulic, fuel or oil systems. This feature of an obsolescent design is proving to be extremely dangerous in today's aircraft.

The next most susceptible component is the electrical AN (Cannon plug) coupling—but that's another problem with even a more complex solution.

To cope with the Murphy potential of check valves in hydraulic systems, design specification Mil-H-5440D spells out the following requirements:

"Components, such as one-way restrictors, flow regulators and filters, shall each have a permanent placard on adjacent equipment or structures, visible with component installed, to indicate the correct direction of installation. *Arrows on connecting lines are not sufficient for this purpose.*" Italics are ours.

The direction of flow in lines leading to and from each check valve shall be clearly indicated by arrows on each line or, if the structure immediately adjacent to the check valve is not visible, a visible placard shall be provided to indicate direction of flow."

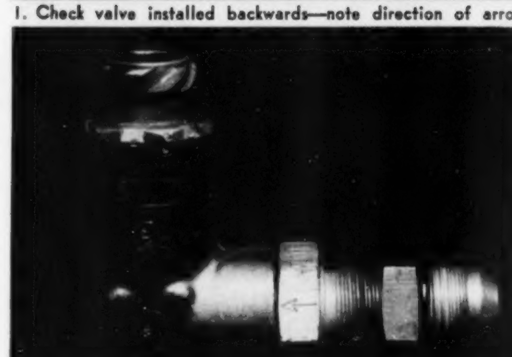
Although future aircraft, conforming to these specifications may thwart Murphying check valves, what do we do now?

Reporters of Murphy situations most frequently recommend color-coding corresponding fittings at the local level and PAR changing the size of fittings to preclude mismating.

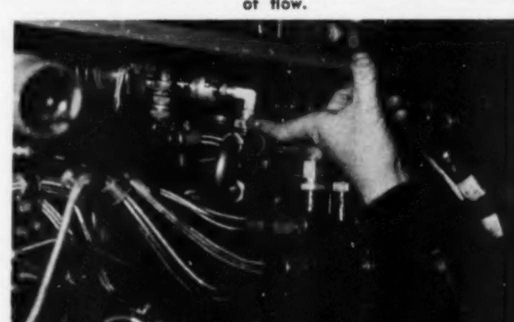
Color-coding at the field level seems to be the most practical. Retrofitting during PAR, in most cases would entail considerable work and expense to modify lines, valves and accessories. This is not really practical unless safety of flight is involved, or if a misinstallation cannot be detected by a routine functional check. It is significant that the design specification states in effect that even if a reversed installation can be detected by a functional check, but can cause system damage, irreversible components *shall* be used.

It seems these criteria should apply to aircraft now on the line. If a retrofit of different size fittings is not justified during PAR, then certainly the decal requirement should apply not only to hydraulic sys-

1. Check valve installed backwards—note direction of arrow.



2. Check valve installed correctly—arrow indicates direction of flow.



3. Check valve installed correctly on T58-GE-8 engine.

tems but to pneumatic, fuel and oil systems as well.

Here are a couple of cases that support these points:

Case 1. Check valve 20B21 was installed in reverse on the number 1 engine of a CH-46A. On engine start the engine oil cooler ruptured allowing oil contamination of the fuel system and a fire enveloped the engine—a functional check, but an expensive way to determine whether a one-way check valve is correctly installed. An engine change was then required to repair the aircraft.

Photo 1 shows the check valve installed backwards, photo 2 shows the correct installation and photo 3 shows the relationship of check valve 20B21 to other components in the engine. Figure 4, item 11, of NavAir 01-250 HDA-4-1 refers. There is some consolation in that this particular Murphy only applies to the T58-GE-8 installed in the CH-46A, and that the T58-GE-10 installed in the CH-46D has a check valve with different size thread fittings on each end of the check valve, precluding such a Murphy.

Case 2. The A-7 (one of our latest aircraft) canopy jettison system has four one-way check valves to prevent pressure from a fired initiator from entering the lines of an unfired initiator. See illustrations for location. In addition, the check valve in the line from the M-99 seat initiator prevents gas from entering Mk 11 Mod 0 seat delay initiator line and firing the Mk 7 rocket catapult, causing seat ejection.

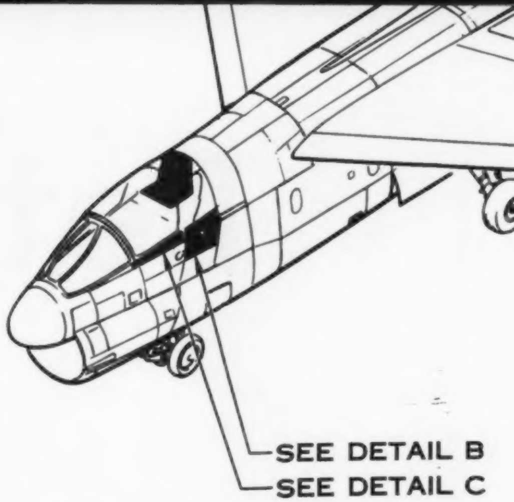
Any one of the check valves can be reversed since both ends have standard AN-4 fittings. If this should happen, depending on which check valve were reversed, any one of the following malfunctions could occur:

- The canopy jettison system would not function.
- The Mk 7 rocket catapult would be initiated causing *unintentional* ejection.
- One or more of the three remaining M-99 initiators could be fired, possibly rupturing lines and creating a fire hazard from heat and pressure.

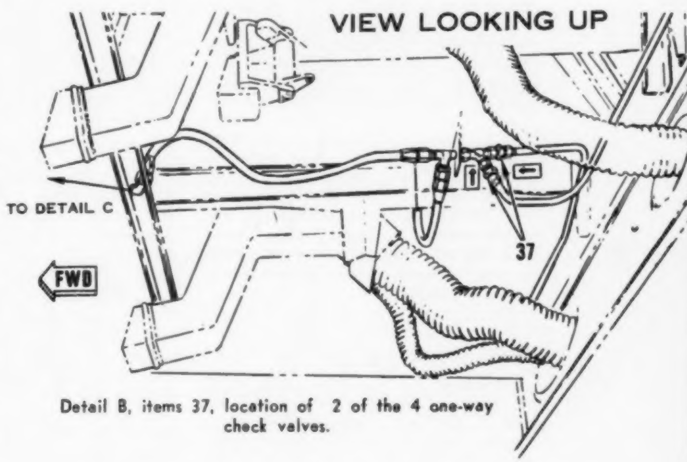
—Again, a helluva way to find out if a one-way check valve is installed the wrong way!

The reporting command recommended via UR that check valves and lines be installed with different sized threads and fittings on each end to preclude incorrect installation. An ECP (Engineering Change Proposal) has been directed since for production and retrofit incorporation of directional check valves in A-7A emergency jettison systems which cannot be installed backwards.

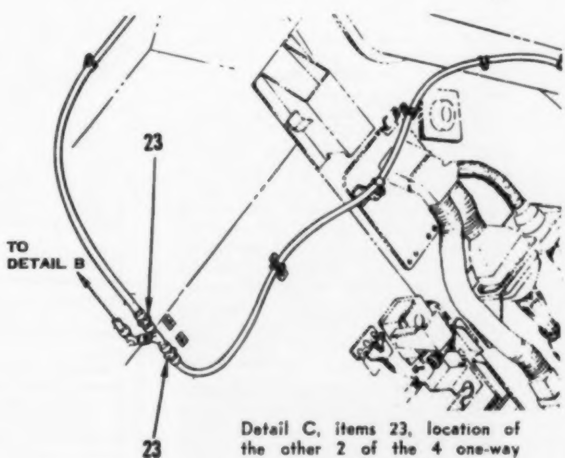
In the meantime, color-coding, installation of decals and plenty of caution to A-7 and CH-46A maintainers should be the practice until these systems are equipped with one-way check valves that can be installed only one way.



Location of one-way check valves in A-7A canopy jettison system.



Detail B, items 37, location of 2 of the 4 one-way check valves.



Detail C, items 23, location of the other 2 of the 4 one-way check valves

Letters

"Vertigo and Anxiety"

Denver, Colo.—I found the article "Vertigo and Anxiety" by Dr. Gary J. Tucker in the February 1968 APPROACH very interesting and thought-provoking. I was a naval aviator during World War II and am now flying for a scheduled airline. Please advise me where I might obtain the publication "Disorientation: A Cause of Pilot Error" and how I could see the movie on this subject, "Vision in Aviation Medicine: Illusions," Navy MN 9480b unclassified, both cited in the footnote on page 14.

A. RAY HARVEY
CDR, USNR (RET)

• "Disorientation: A Cause of Pilot Error" was published by the School of Aviation Medicine, now the Naval Aerospace Medical Institute at Pensacola, Fla. Your best bet on seeing the movie would be to contact your local Naval Reserve unit.

"Passenger Bailout"

Lakehurst, N. J.—Here at NARTU we fly the S-2D aircraft and helicopters of the type mentioned in "Passenger Bailout" in the March 1968 APPROACH. I have a few things to say about the procedures used in this emergency as described in this article.

The pilot who was the passenger that bailed out had sufficient time to don his parachute but neglected to fasten his chest strap although he had time to insure that his helmet was tight. I am of the opinion that he could have lost more than that if he had experienced a bad parachute opening. The survivor reported that talking to himself aloud helped to keep his thoughts straight yet he boarded the rescue helicopter with his parachute wrapped up in his arms. Perhaps he was contemplating another emergency "passenger bailout." The moral of this story appears to be "don't panic."

RIGGER MOUSE

• Thanks for the feedback. Fortunately, the incident described in "Passenger Bailout" ended without loss of personnel or aircraft. It could have been otherwise.

Good Show

FPO New York—"Flight Deck Safety," Film MN 10131 depicting hazards of the flight deck was widely viewed by AMERICA in the following manner:

- Each readyroom, 1,2,3,4,5, and 6 by officers and crew
- Ship's closed circuit TV at 1830
- CPO Mess prior to the regular movie
- On crew's mess decks forward to V-1, V-2, V-3, and V-4 Divs.

I don't think the brig prisoners saw it, but who wants to be perfect? Thanks for cutting us in on the advance copy.

ABCM T. W. KERN
LCPO AIR DEPT

• Copies of the film are now available from your nearest training aids library. Recommended viewing.

MOVLAS

Patuxent River, Md.—The hazardous conditions produced by ships' movement in the article "Wind, Waves and CVs" are vividly brought to attention by the hairy tales mentioned. The considerations stated are sound and should be taken to heart by all tigers who pride themselves on being carrier pilots.

I believe more should be said about the use of the MOVLAS during pitching deck operations. It is true that line stabilization of the ball has made rough sea landings less difficult, *but not much.* The Fresnel lens seems to be little or no help when the ball is moving from a low indication to just off the top of the mirror as stated by one of the pilots in your article. This is the normal rather than the exceptional indication presented by the lens in those conditions. I would go as far to say that I've seldom experienced satisfactory lens stabilization even with slight deck movement.

The MOVLAS is the only answer (seems unfortunate considering the state of the art of big boats and fast aircraft)—a visual aid that presents a steady glide slope indication regardless of deck conditions. Needless to say, it requires an experienced LSO to use the MOVLAS to its full potential. LSO training is a necessity. Many CVW LSOs rig the MOVLAS once a week aboard ship in an effort to keep the LSOs proficient. This to me is a sound practice and is highly recommended.

Many advancements have been made in visual landing aids but until an improved stabilization system can be developed LSOs should give more consideration to the use of the MOVLAS during pitching deck operations.

LCDR SPENCER J. THOMAS
NATC

• Thanks for this amplifying information.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.
Address: APPROACH Editor, U. S. Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Safety Center.

Strobe and Helos

FPO, San Francisco—We at HC-7 read and discussed with interest the letter in Forum, February 1968 APPROACH, concerning the use of the strobe light by downed aviators when a helo was in the vicinity. Our primary mission is combat search and rescue utilizing both the UH-2 and SH-3.

Many of our pilots have had experience hovering over strobe lights both in training and in actual rescue situations. We have discussed our varied experiences at length and are in agreement on when and where a strobe light should be used. Here are our thoughts on the matter. We hope you will assist us in giving these the wide dissemination we would like them to have.

First of all, the strobe light is an excellent means of locating a person in the water at night. When the strobe is used in conjunction with the survival radio (AN/PRC-63), a downed aviator has increased his chances of

being located at night immeasurably.

Once the helo crew has located the rescuee and is approaching his position, the strobe light has essentially served its purpose. However, don't turn it off! The helo may or may not be using lights, depending on the location and circumstances of the rescue (i.e. close proximity of enemy positions). With or without lights, the strobe is the only reliable visual reference for the helo pilot to pinpoint the survivor. Even a night smoke light will be some distance from the survivor. It is true that an approach to and hover over a strobe is uncomfortable and can have a disorienting effect on the helo pilots. However, practice, experience and cockpit teamwork will minimize the possible dangers arising from this uncomfortable situation.

The strobe light's effect on pilots is not the same in all helicopters. In the UH-2, the rescue hoist comes down right next to the right seat pilot enabling him to observe both the rescue sequence and his position over the survivor. In this case, the effect of the strobe light may be quite pronounced. However, the airframe structure shields the copilot from the direct glare of the flashes and he is able to fly instruments while the pilot remains visual. In the SH-3 aircraft, once the pilot establishes a hover for the pick up, he will have little trouble with the flashing strobe light. The rescue hoist in this aircraft is located above the cargo door, aft on the starboard side. The rescue sequence and the strobe light's flashes are out of the pilot's visual range and he must rely on the directions from his crewman. However, the SH-3A pilot may feel uncomfortable during his approach to the survivor.

In most cases the strobe light problem will be solved for the survivor by the appearance in the water of a crewman from the helo, as the squadron policy is to put a swimmer in the water on both day and night rescues. However, this policy can be overridden in specific cases by the HAC when existing conditions dictate. All HC-7 aircrewmen go through an intensive rescue course prior to being designated rescue aircrewman. When one goes to the aid of a survivor, he will first insure the survivor is ready for pick up and then signal the pilot to move in.

In summary, the strobe light is an invaluable aid in locating a person in the water at night. However, it is a somewhat uncomfortable reference during approach and hover but we felt it should not be turned off for any reason less than enemy fire and then only when the rescuee can feel the rotor wash. Generally, the survivor will receive assistance within seconds of the helo's arrival in the form of a swimmer from the helo. Let him work—he's better than insurance. We at HC-7 hope this information will clear up some doubts surrounding the use of the strobe light.

LT. A. J. CURTIN
ASO, HC-7

The new flight deck crewman's flotation vest (FSN 2H-4220-926-9438 through 9458) is shown uninflated (left) and inflated (right). The vest comes in three sizes, small, medium and large, and in seven colors to designate different aviation functions.

Vol. 14 **approach** No. 1

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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CREDITS

Cover painting shows the Navy's famous SP-2H on station by Blake Rader. Courtesy Robert F. O'Connor, Boston, Mass.

Pg. 2 (Top) Photo by Ray Malinowski (Bottom) Photo by Jack Gaty, Beech Aircraft Corp.

Pg. 26-30 Photos courtesy USCG

Pg. 37 (Bottom) Photos by Art Schoeni courtesy LTV

Pg. 40 Photo courtesy Grumman Aircraft

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Next Month

Five Seconds and Out!

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Safety Resolutions

Safety in all facets of hazardous and strenuous duties comes neither easily nor quickly. Unquestionably, manpower and equipment are essential for developing and maintaining our objectives of the best attainable state of combat readiness, effectiveness, and flexibility. With 7 out of 10 operational accidents resulting in strike damage, and casualties to personnel and equipment due to shipboard mishaps, only unrelenting, persistent productive effort can conserve our resources. With hindsight for reference, and foresight to prepare for insuring our objectives are achieved and maintained, the following resolutions are proffered for all individuals serving in the naval aviation community:

a. Develop and promote in oneself and coworkers a sense of safety consciousness.

b. Thoroughly brief, indoctrinate, and educate all new people in their duties, the hazards of these duties, and the consequences to personnel and equipment if they are not carried out in the prescribed manner and the hazards are not completely understood.

c. Be prepared for any eventuality prior to and during the performance of a task.

d. Don't become so complacent and be in such a hurry that short-cuts and substandard performances become acceptable.

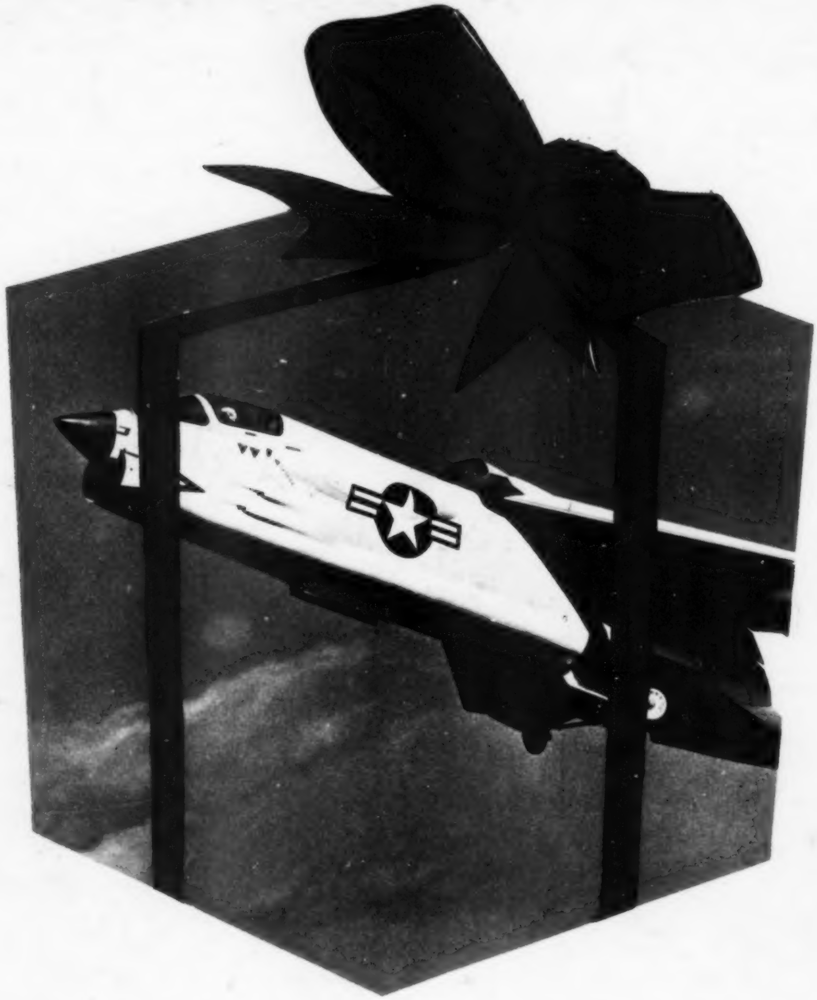
e. When in doubt, consult one who knows.

f. Search for and identify hazardous conditions and insure that those who are responsible for the condition and remedial action are immediately notified.

g. Train yourself and others with "quality" as a prime criterion.

—NavAirPac Weekly Advisory

LIFT and DRAG



What Is the Price of Your Safety Package?

If you have done your level best to advance safe flight operations then you know safety is the one area where you cannot afford to cut the price by either slowdown or stoppage. Too little effort on your part and the price goes up. Lose just one man and the price goes out of sight. Only maximum effort by all hands brings the price down or at least makes it a bargain. Don't believe it? Check with the pilot who **did** preflight properly and found a wrench loose in one of the control spaces. This man can tell you what a bargain safety is. And that brings us around to another point. This is an advertisement for life. Yours.